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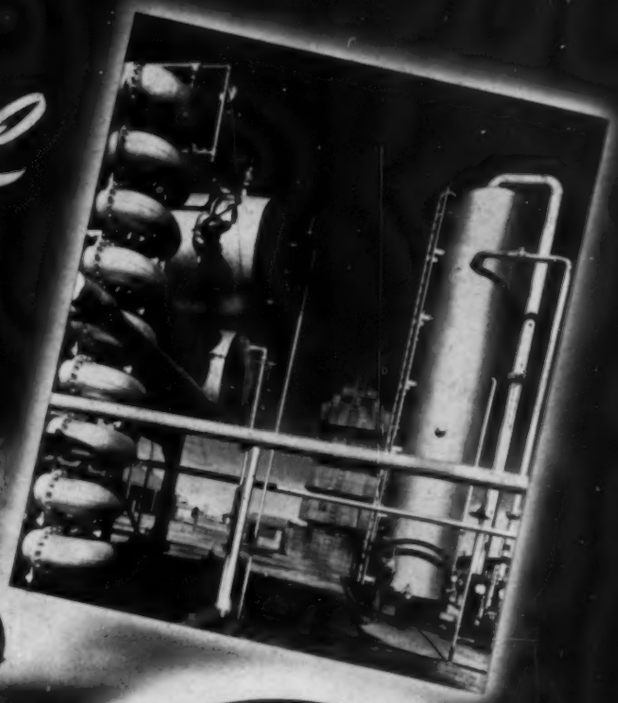

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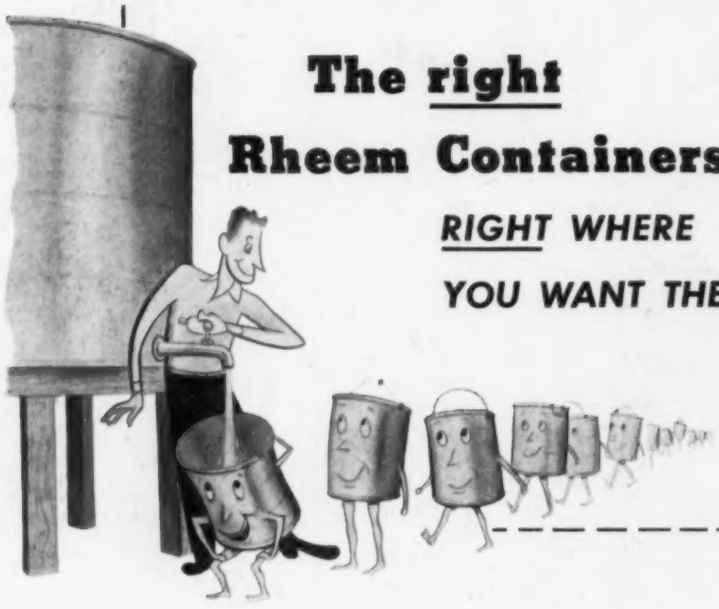

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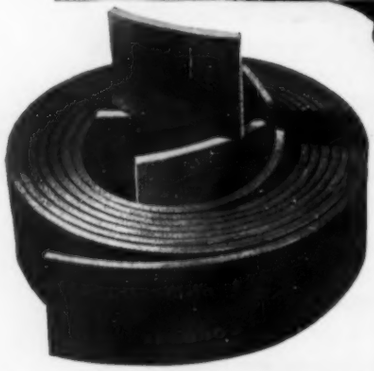

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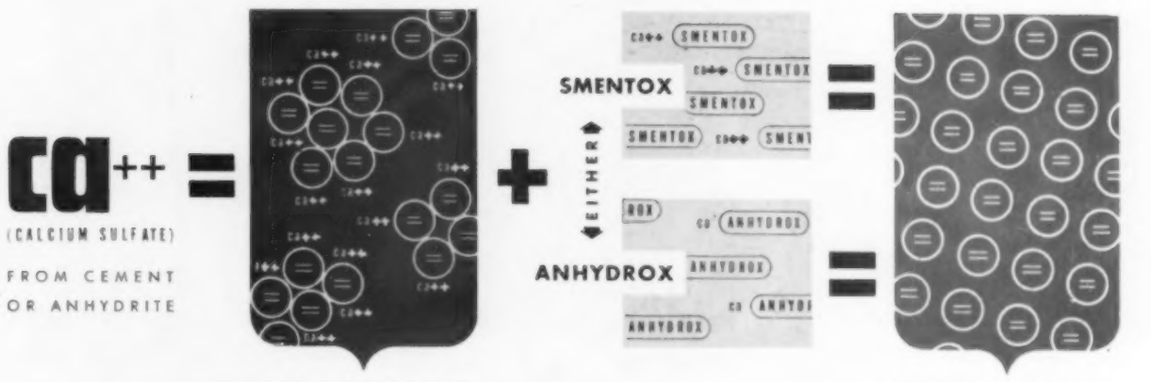

FLOCCULATION: ***The grouping of the colloidal particles due to a reduction of their electrical charges***

Calcium sulfate drilling-mud contamination may occur in the formation, in underground waters, in surface waters, or from cement-cutting. The complete contamination (flocculation) may result in an air- or gas-cut mud, caving shale conditions, a water-block of the section, or stuck tools.

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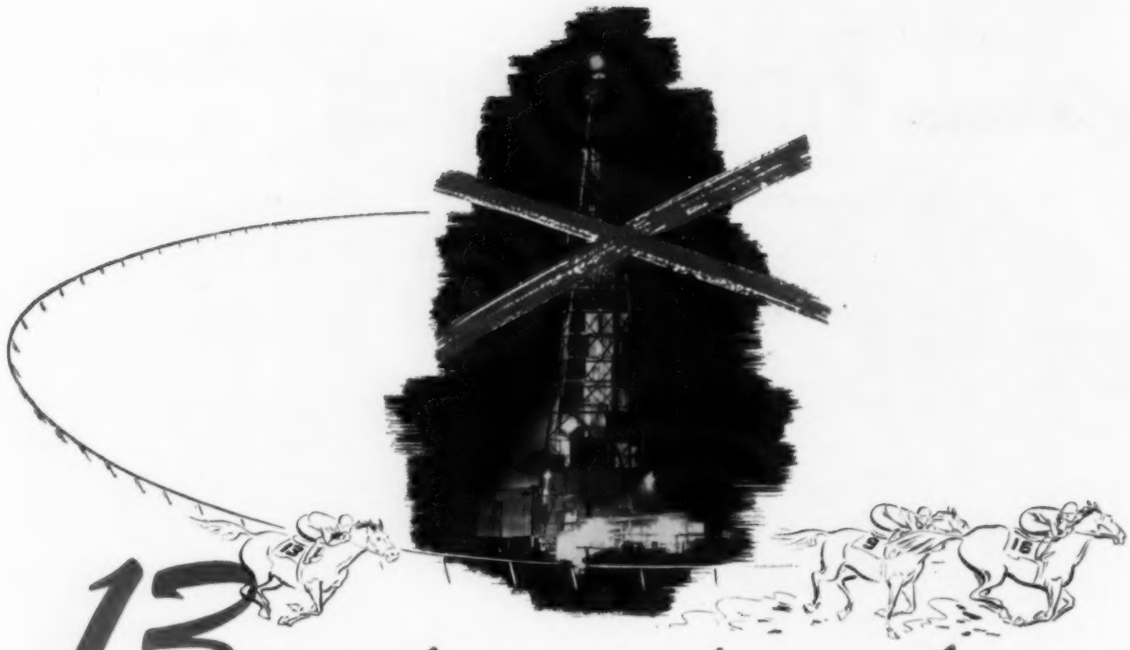

13 was his unlucky number...

HE LOST A 50-TO-1 SHOT!

CASE HISTORY NO. 24

In a Texas field, 13 wells were all drilling to 10,500 feet. All the operators, except the 13th, had their drill pipe fully rubbered with Patterson-Ballagh Casing Protectors. This one operator was trying to drill *his* well *as cheaply* as possible.

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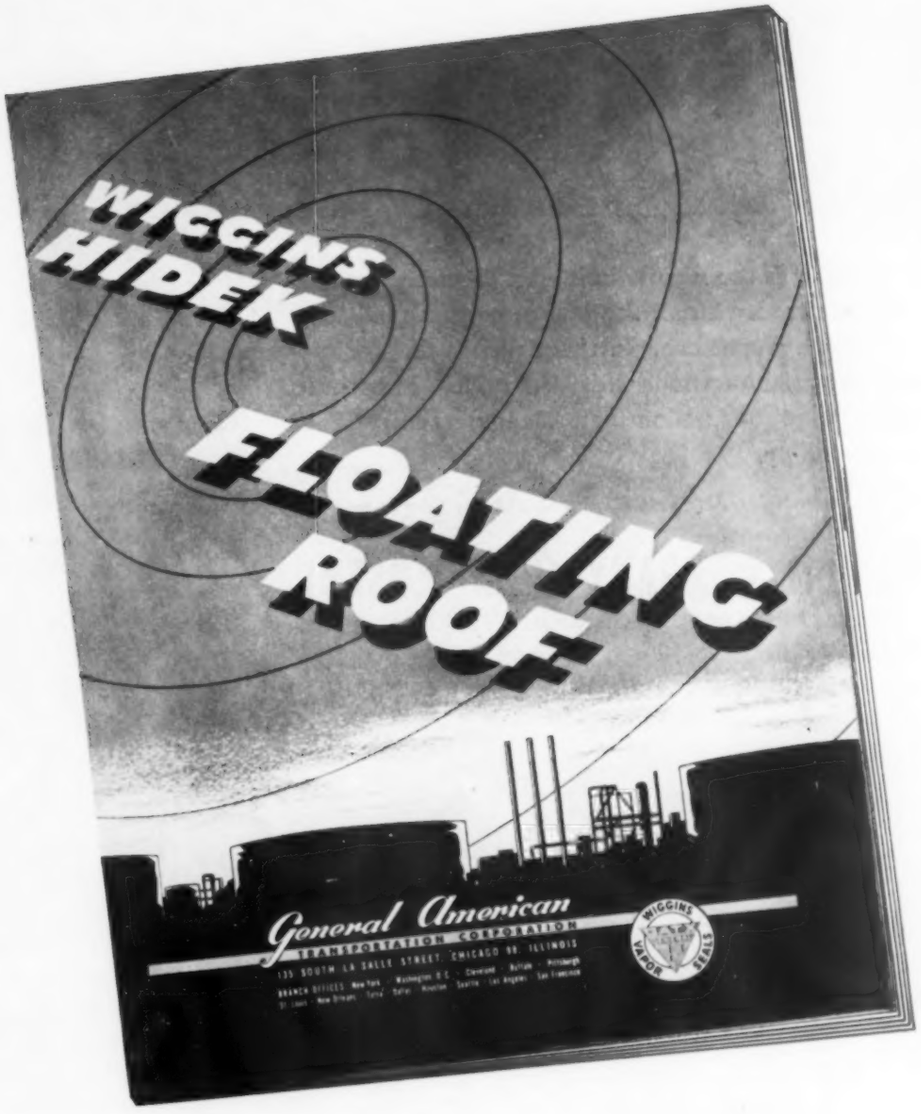

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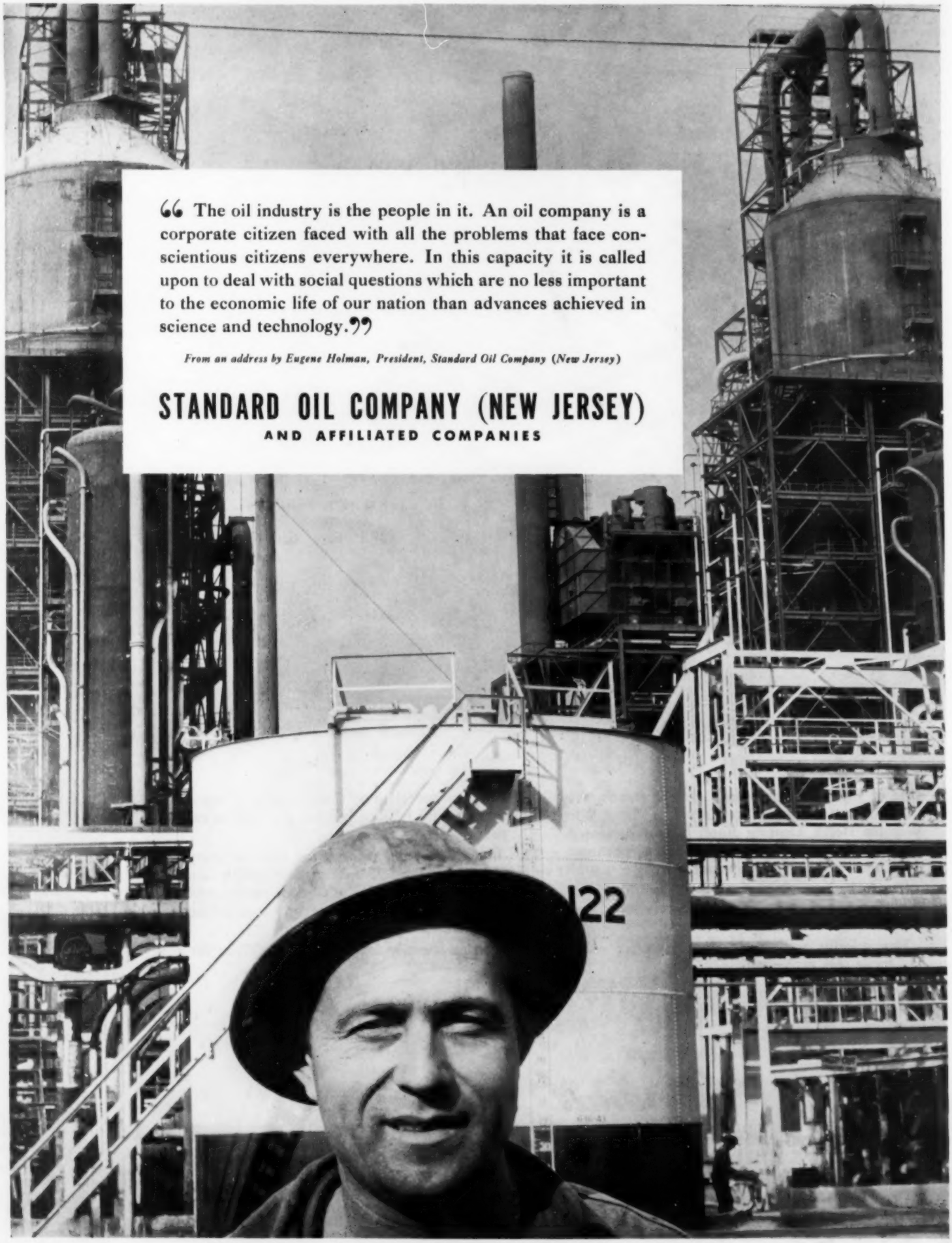

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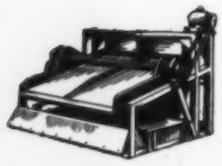

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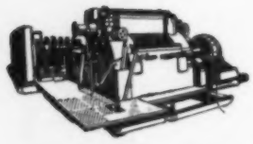

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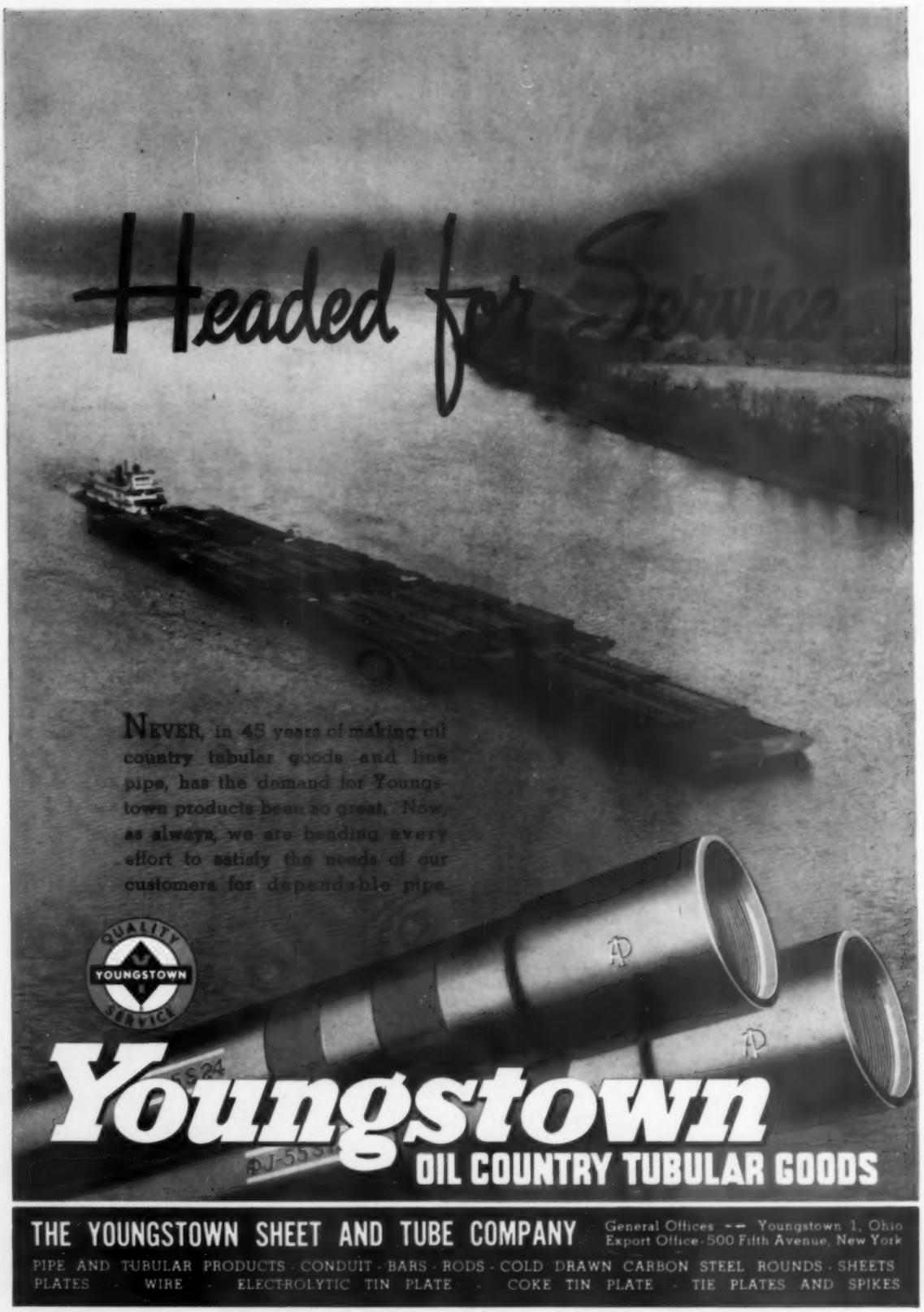
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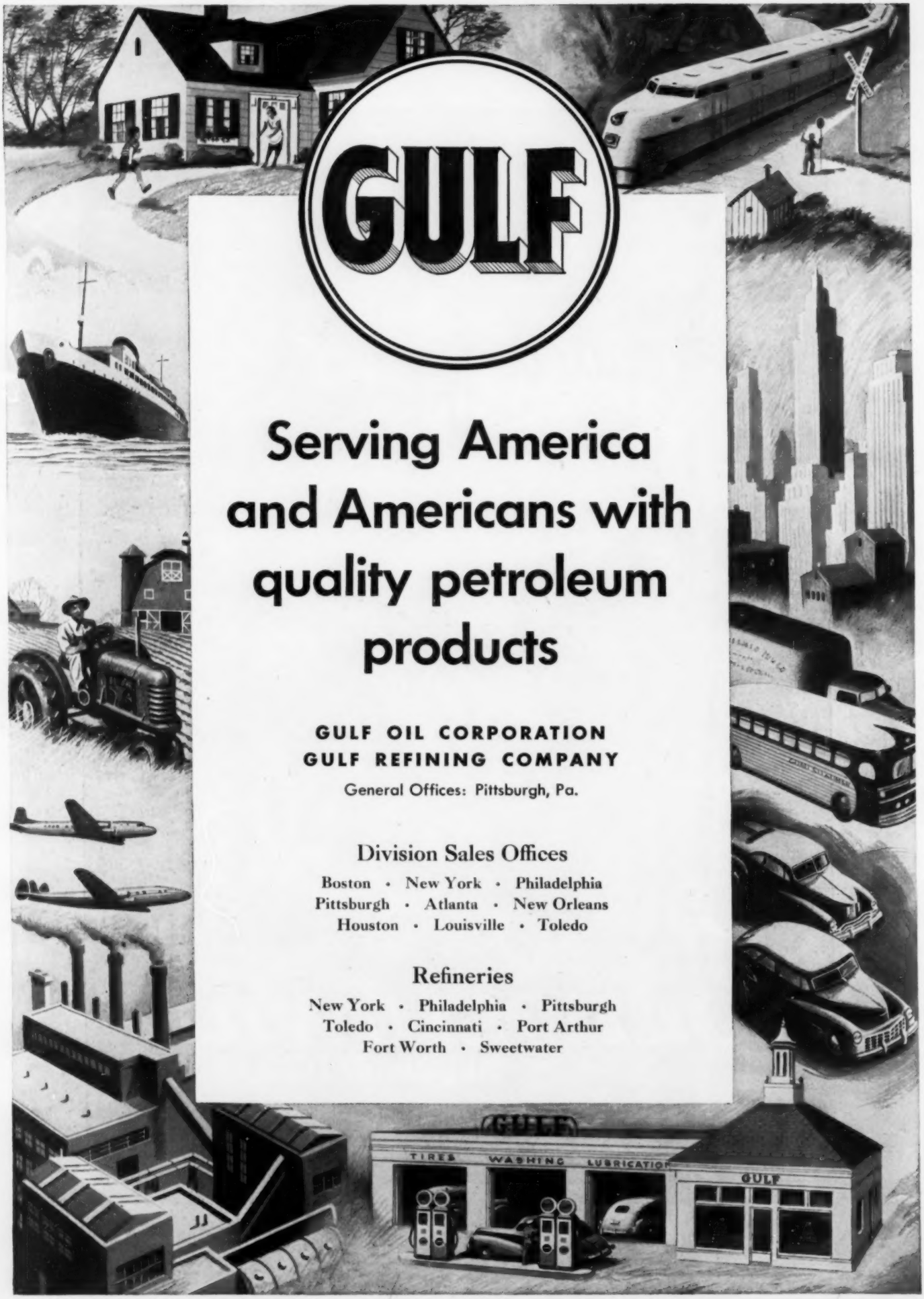

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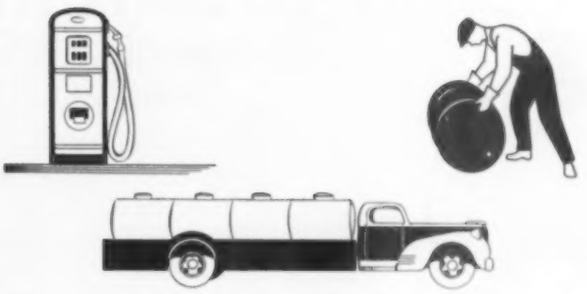

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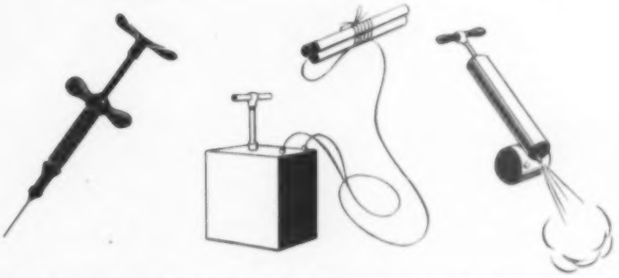

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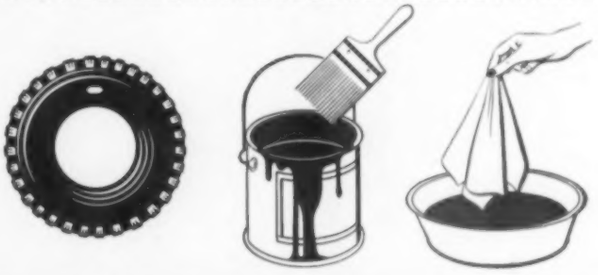

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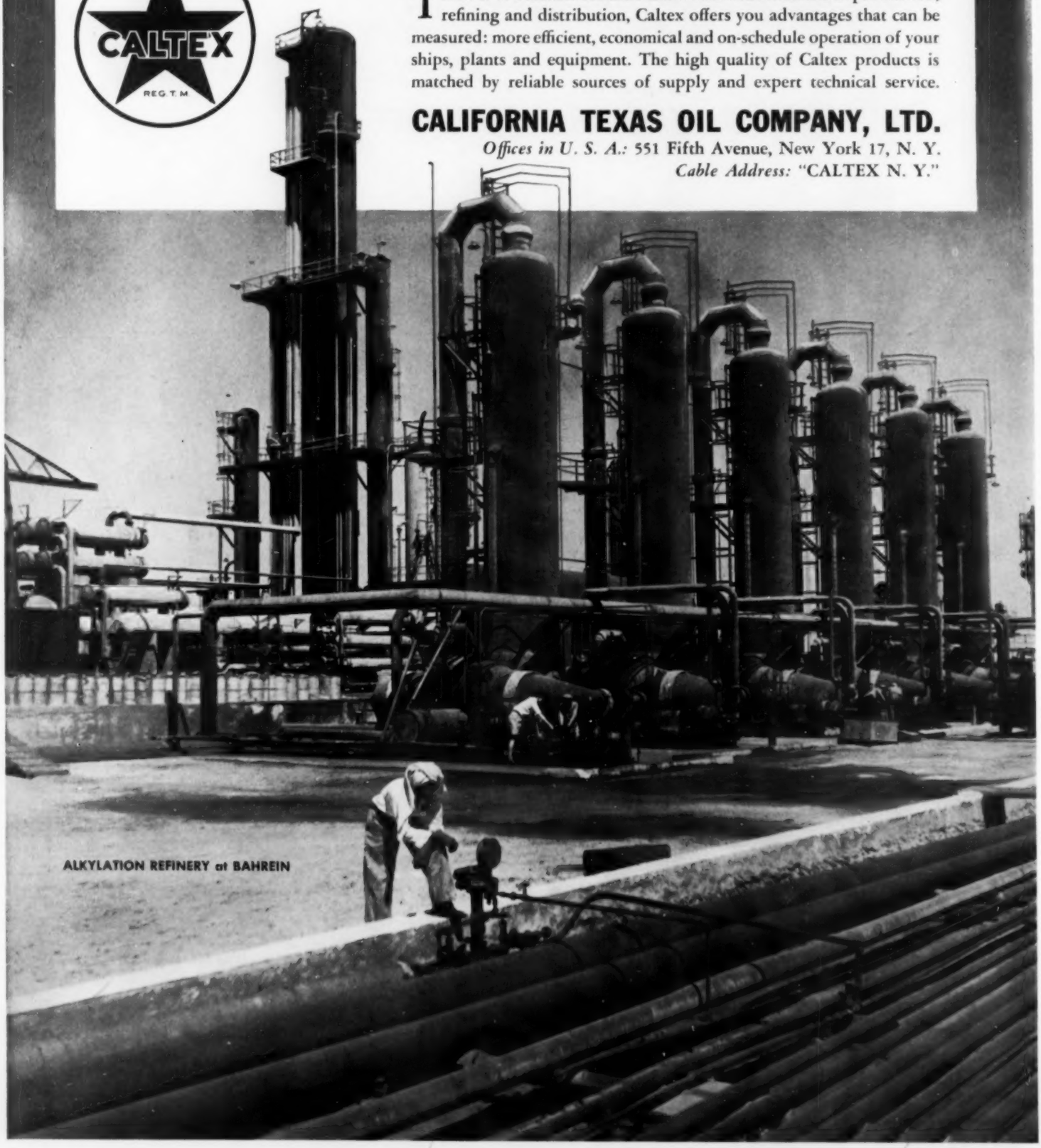

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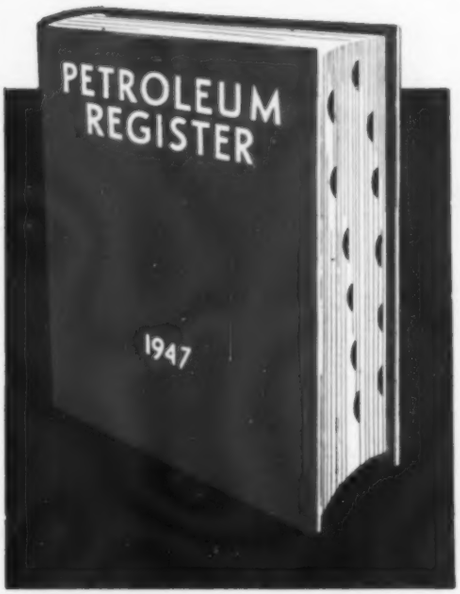

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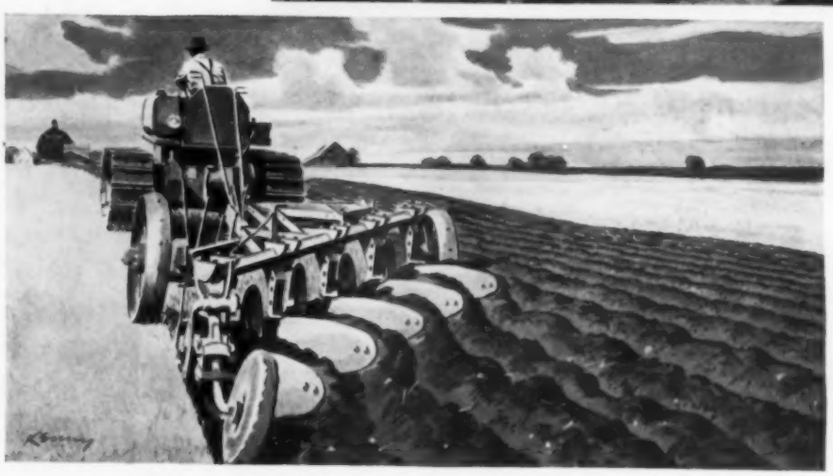

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TIME WAS...not so long ago...when old Dobbin was the only horsepower down on the farm and his plodding gait set the pace for progress.

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Today, no less than 72 farm machinery makers approve and recommend Socony-Vacuum products.

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PLANCOR 2277
SUNRAY, MOORE COUNTY, TEXAS
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(1) As a whole, for operation at present site; (2) as a combination of burner units, plus appropriate accessory buildings and equipment for operation at present site, or—
FOR SALE*
(3) As a whole, except dwellings for dismantling and removal from site; (4) any combination of burner units, plus appropriate accessory buildings and equipment for dismantling and removal from site.
*If the entire plancor except dwellings, not offered at this time, is sold for dismantling and removal from site, the dwellings will be offered at a later date.
War Assets Administration invites proposals for the purchase or lease of Plancor 2277, a channel-type carbon black plant now being operated by Continental Carbon Company at Sunray, Moore County, Texas.
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The Texas Railroad Commission issues permits for burning natural gas in carbon black plants on an annual basis. A prospective purchaser or lessee for operation of all or part of the plancor at its present location should make his own arrangements to obtain necessary gas supplies.
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Your sealed proposals on Standard Bid Forms will be received by War Assets Administration, Office of Real Property Disposal, P. O. Box 6030, Dallas 2, Texas, until 2:00 P.M., C.S.T., August 15, 1947, at which time all proposals will be publicly opened and read. Credit terms may be arranged. War Assets Administration reserves the right to reject any or all proposals. For a more detailed description of this property and for Standard Bid Forms write:
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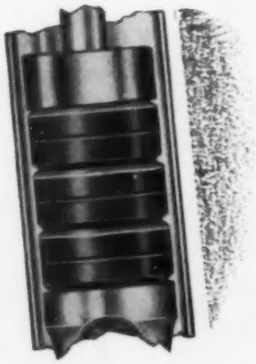

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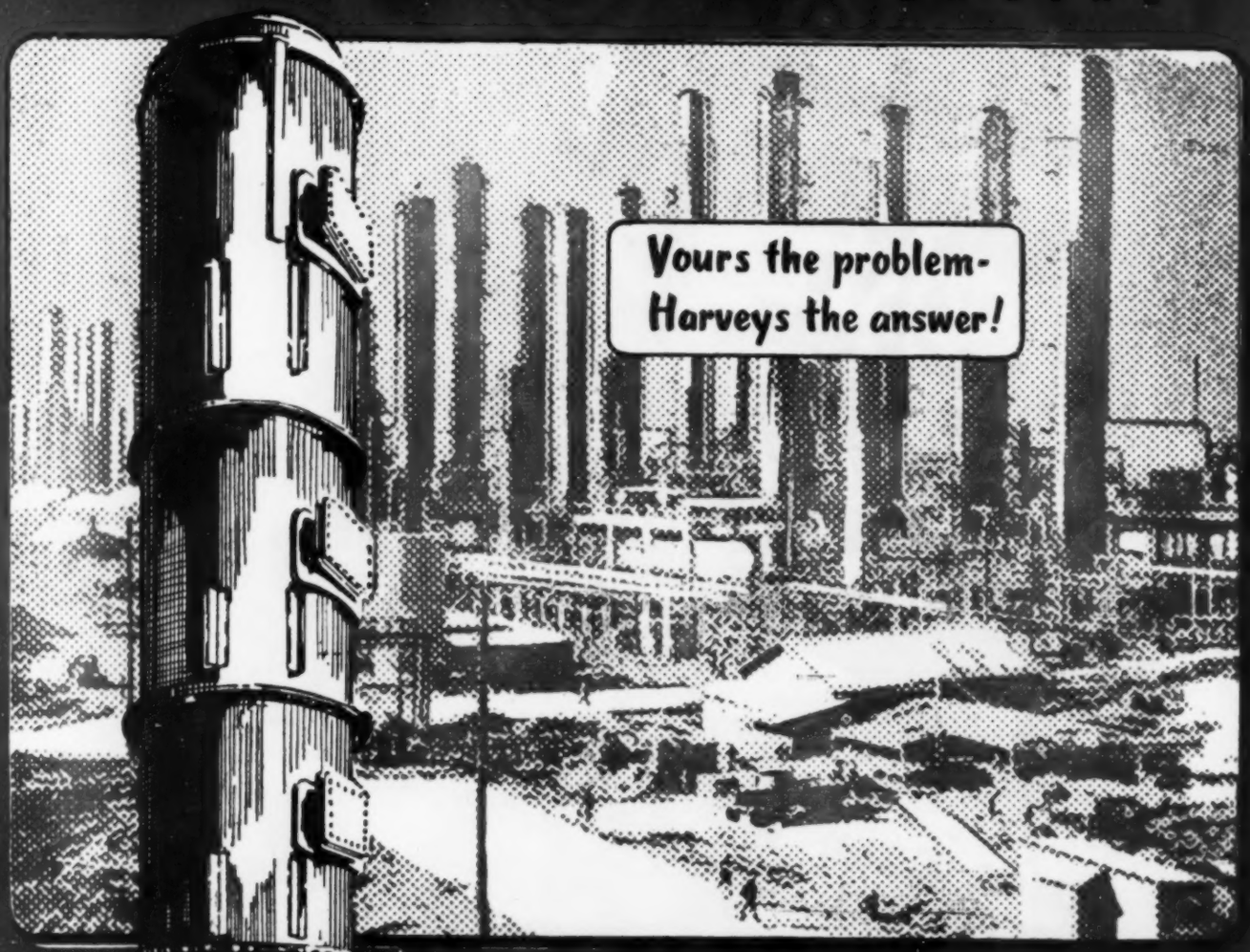

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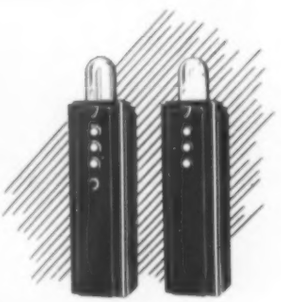
Chlorination applied through the W & T De-Sliming Process, at a total annual cost of approximately $5000 including amortization and all operating expenses kept the condensers slime-free, eliminated the need for plug cleaning and reduced equipment outage time.



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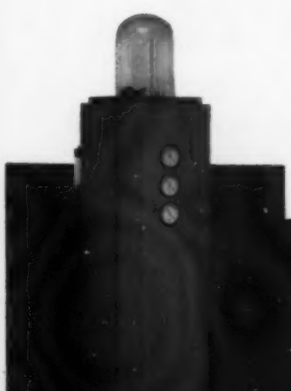

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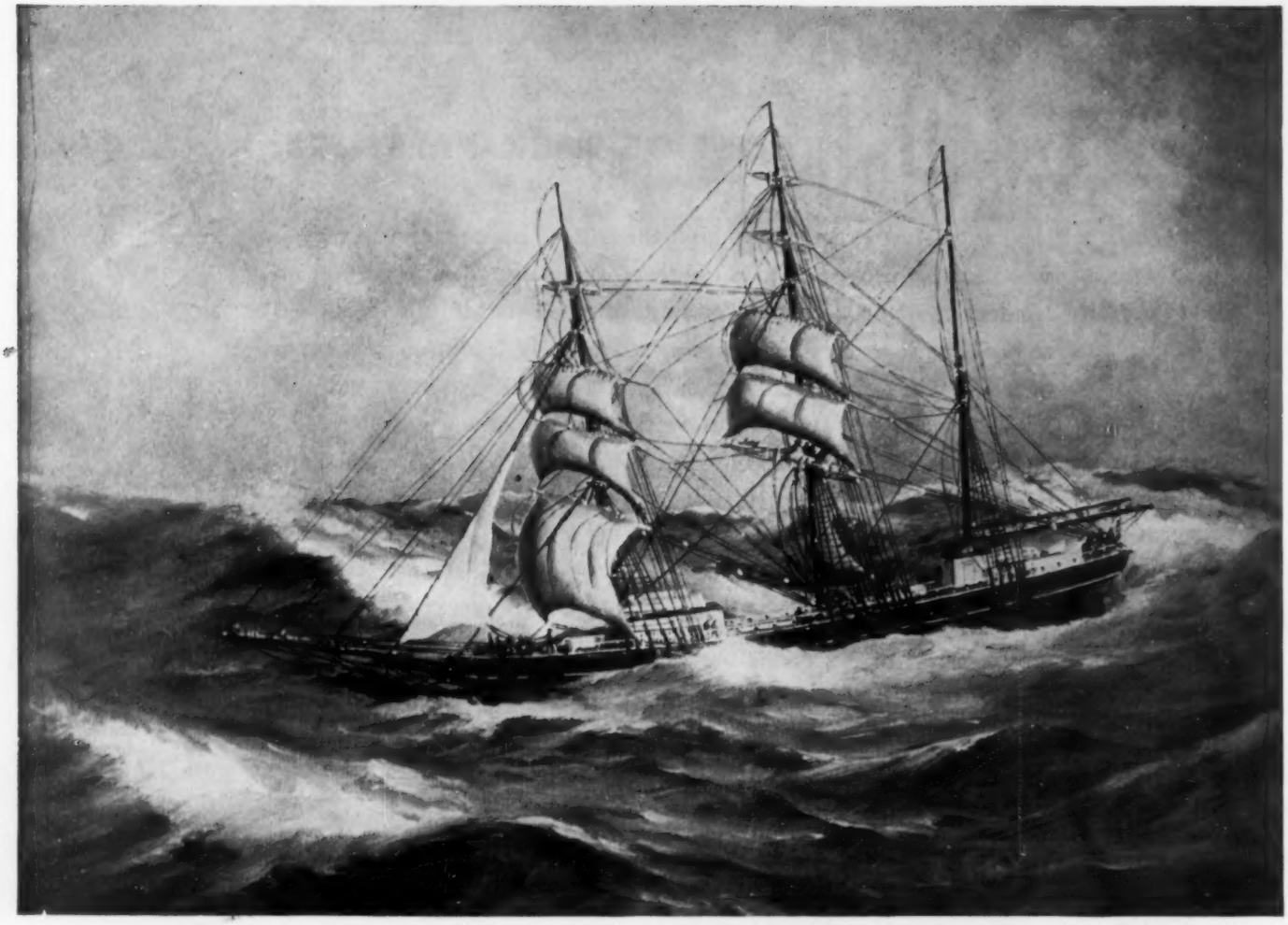

The Barque Georgietta, 459 tons, "running down her easting" in the Indian Ocean, en route to Australia from New York, in the "eighties", carrying case oil.

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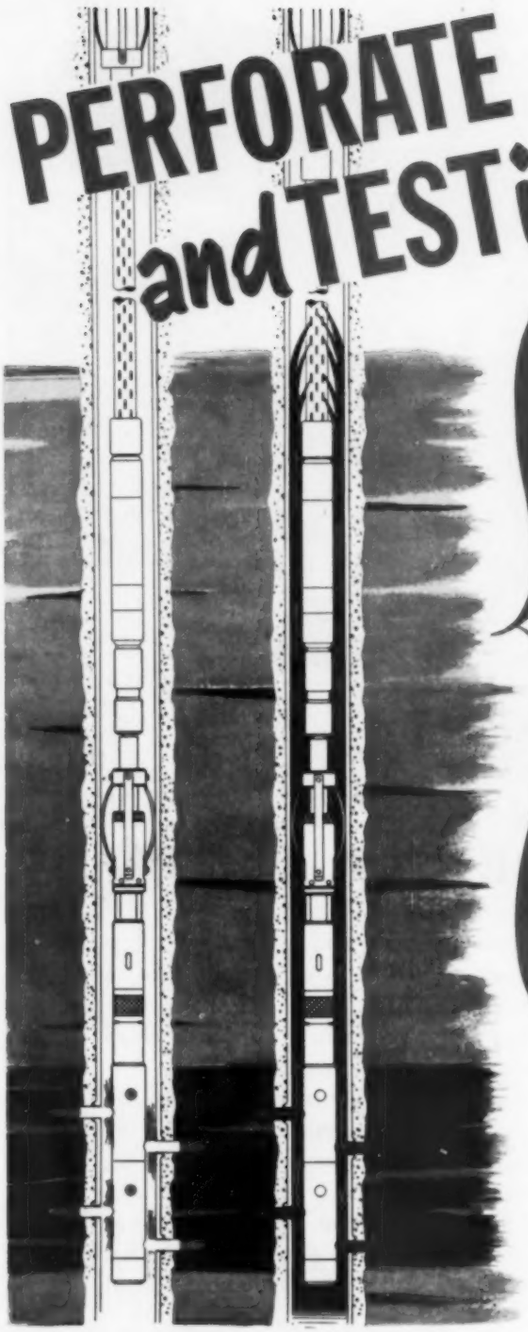

The Johnston "PERFTEST" Gun Perforator at moment of fire.

Following perforation, formation fluid enters Johnston Tester Assembly.

By unitizing a Johnston "PERFTEST" Gun Perforator with a regular Johnston Formation Tester Assembly, any designated formation can be both perforated *and* tested in one round trip of tubing or drill pipe. The "PERFTEST" Gun Perforator is easily adapted to Johnston test equipment for combined Perforation and Test operations. Simple top-hole manipulation of the string by the driller fires the gun perforator to perforate casing and actuates the tester assembly to test formation immediately following perforation.

The Johnston "PERFTEST" Gun Perforator has the versatility to be used solely as a casing perforator or as the perforating unit in combined perforation and test operations. Its design embodies many advanced features to make it the ideal choice for operators desiring the utmost safety and efficiency in perforation equipment...

The "PERFTEST" offers these advanced features

SAFER Gun Perforating operation because the "PERFTEST" will not fire until subjected to both in-the-hole hydrostatic pressure and manipulation of string.

POSITIVE FIRE of all bullets is assured by the flash-hole design of the Perforating Gun Bodies.

EXACT POSITIONING in zone is determined by actual pipe-in-the-hole tally.

SELECTED NUMBER OF PERFORATIONS is determined by the number of four, five or six-shot Perforating Gun Body Sections attached to the firing-head.

NO EXTRA EQUIPMENT other than the "PERFTEST" Firing-Head, the Perforating Gun Body Sections and Reloading Kits is needed for the average perforating program.

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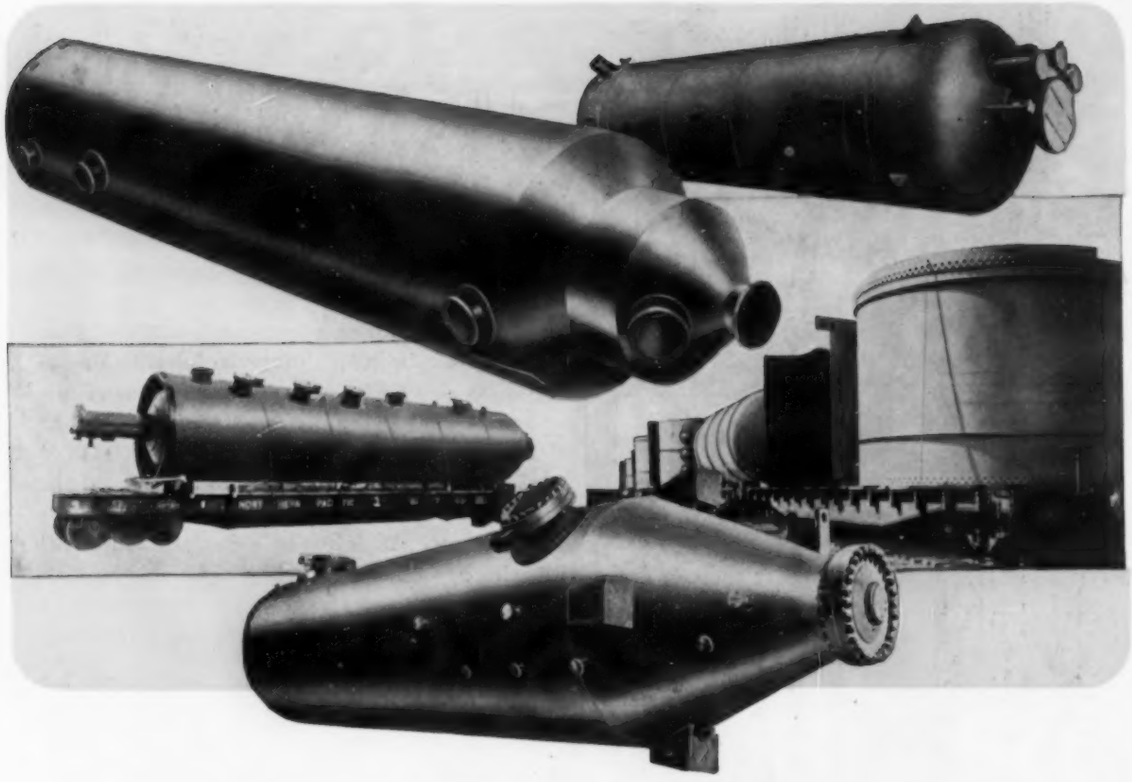

PICTURE OF A PENNY SAVED

For as many years as General American has been designing and fabricating process equipment for the Petroleum Industry, a penny reduction in the retail price of gasoline has been headline news.

The comparatively low cost of American petroleum products is due as much to high efficiency, low-cost production as to our abundant natural resources.

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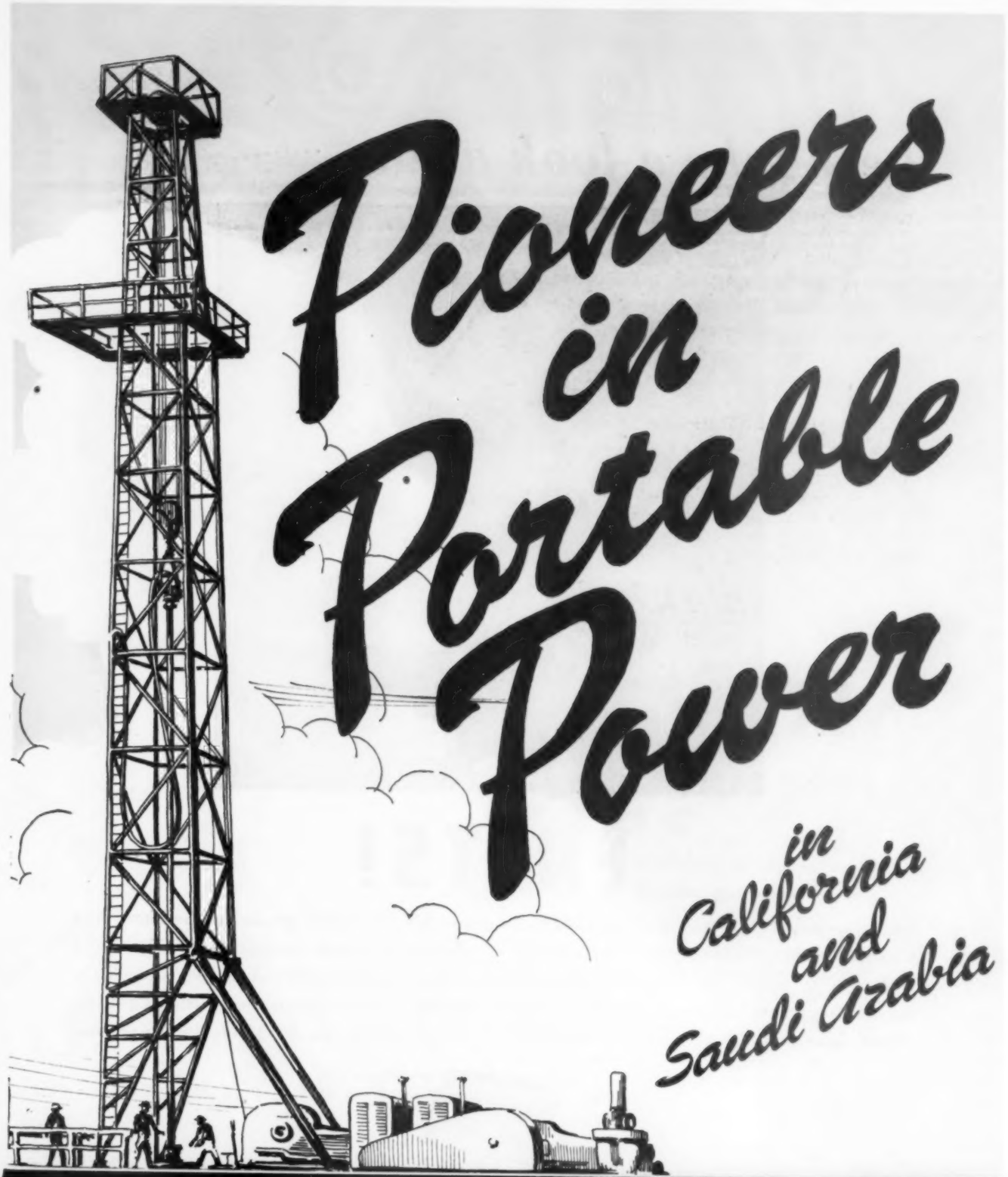

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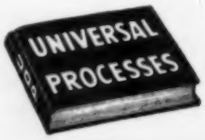

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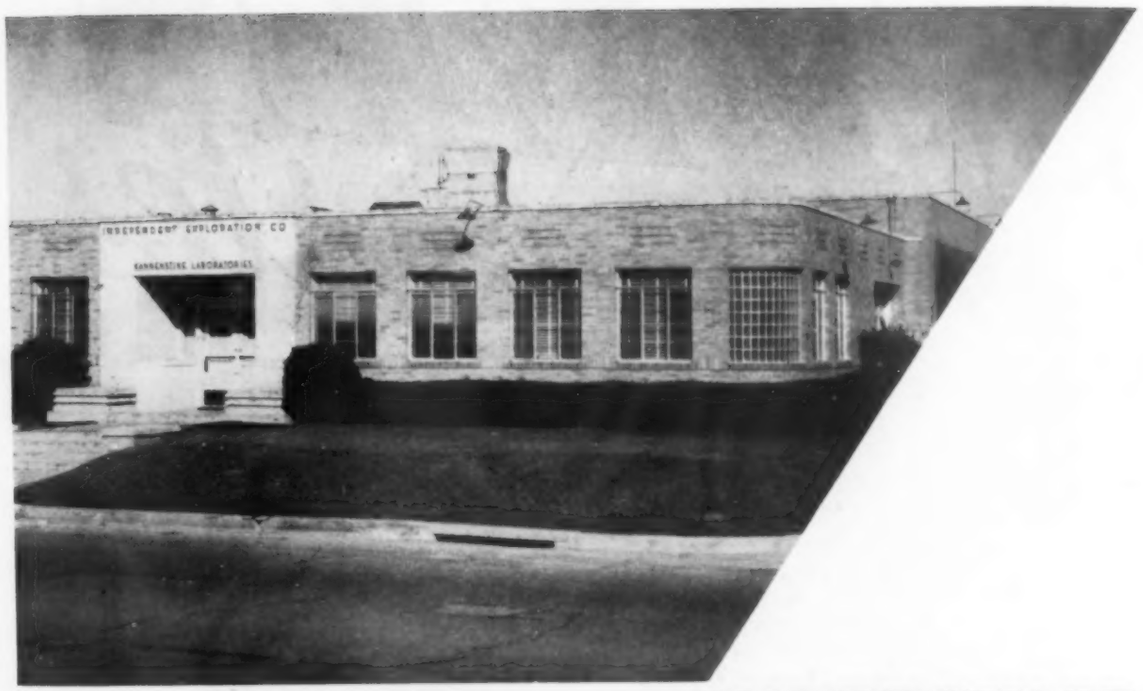

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WORLD PETROLEUM

PUBLISHED BY MONA PALMER

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Managing Editor

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This Month's Cover

Pressure storage at the McCarthy Oil & Gas Corp. gasoline plant in the Winnie field in Texas. Photo by Elwood M. Payne.

TCC REQUIRES MINIMUM MAINTENANCE...

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These are typical—not extraordinary—examples of how TCC's basic simplicity of design pays off in minimum maintenance. Its shorter turn-around time saves money and man-hours. This is of particular advantage in refining operations of relatively small size, where a single catalytic unit is the only source of high-quality fuel. It is easy for such a refiner to build up, in advance of turn-around, a sufficient backlog of catalytic motor fuel to keep him in production throughout the brief turn-around period.

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EDITORIAL

RISING DEMAND PUTS HEAVY TASK ON OIL INDUSTRY

THERE has been much discussion pro and con among oil men on the subject of supplies, more particularly a possible scarcity of fuel oil that might inconvenience consumers during the coming winter months. Some operators are indignant at stories carried by the daily press in which the word shortage is played up conspicuously and threateningly. Others, impressed by the rapid upswing in demand and the decline in stocks as measured by days of supply, insist that it is better to face not only the facts of the current situation but also future possibilities while there is still time to make needed adjustments, rather than to risk a crisis which could not be quickly relieved once it had been allowed to develop. In reality the divergence of opinion is not so great as it has been made to appear. It arises largely from the verbiage used in some of the published statements, especially in arguments before Congress.

Actually, as those engaged in oil marketing activities are well aware, there are local deficiencies in supply at various point on the oil map. There are refiners who are unable to obtain all of the crude they need, or of the kind they need, from their customary sources of supply. Witness the allocations of gasoline in the Midwest and the resort to tank car transportation for the movement of crude in certain areas. These local shortages, while annoying and expensive to those directly effected, do not reflect the general supply situation.

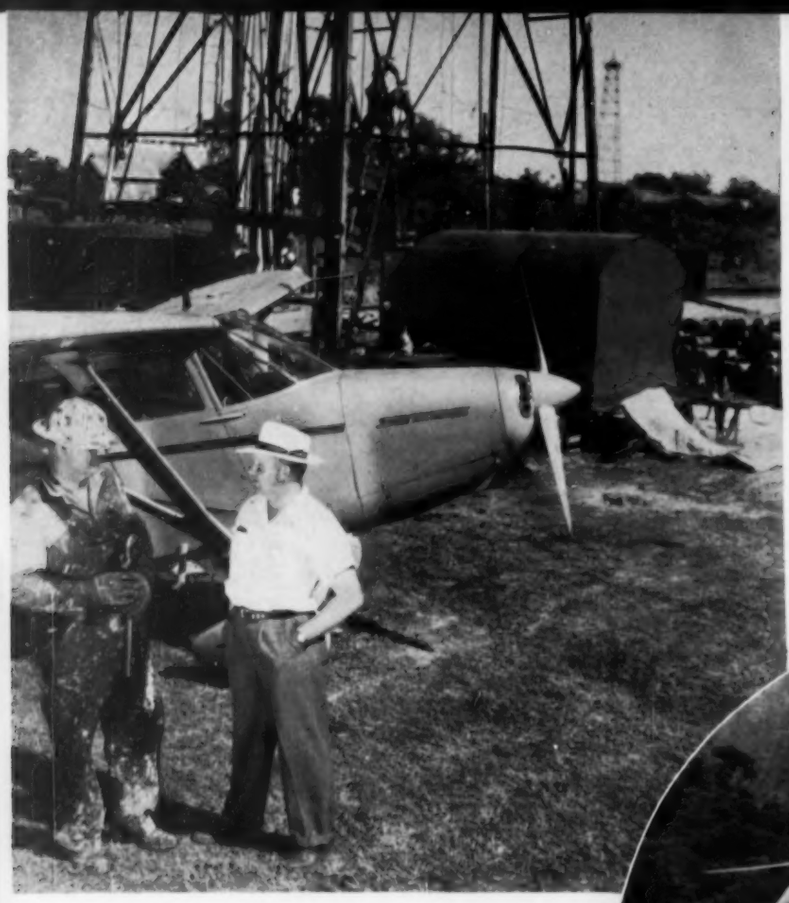
The fact is that the oil industry is beset by many shortages, but not of its own making. Drilling is hampered because of the scarcity of casing and drill pipe. The laying of thousands of miles of oil and gas pipes has had to be deferred by the impossibility of placing orders for line pipe delivery before late 1948 or 1949. There is an imminent prospect of insufficient tanker capacity because of the delay of Congress in amending the legislation which prohibits the Maritime Commission from chartering its vessels after June 30. There is oil enough to be had to satisfy all needs if the facilities for producing, transporting, refining and distributing its products were adequate. The oil industry is doing its best to overcome these handicaps, but where, as in most cases, lack of materials and equipment is responsible, the remedy for the time being is beyond its reach.

There is no denying that the unexpectedly rapid upswing in demand for petroleum products has placed a heavy responsibility upon the oil industry. With world consumption growing at a rate beyond precedent, new fields must be discovered; many more wells must be drilled. The movement of oil and gas from field to market lags behind expanding needs. Pipe lines of greater capacity than ever before laid are on the boards of engineering departments, to be built the moment materials can be delivered. In spite of the great additions to refining capacity during the war, the industry is entering upon the greatest era of refining construction in its history. A recent survey conducted by the statistical division of the American Petroleum Institute showed that in the United States, which is far better supplied in this respect than is the rest of the world, reporting companies propose to add before the end of 1949 daily capacity of 407,000 barrels. International companies doing business in various parts of the world, after studying the trend, are making breathtaking preparations to expand producing, transporting and processing facilities. In a recent statement to shareholders, officials of Standard Oil Company (New Jersey) revealed that capital expenditures for the current year are more than double the average for the period immediately preceding the war, amounting to some $350,000,000.

In a summation of financial demands confronting the petroleum industry, Dr. R. E. Wilson, chairman of the board of Standard Oil Company (Indiana), placed the necessary expenditure on new facilities and improvements at three billion dollars annually for the next several years. This amount, he estimated, will be required to find and develop new sources of crude oil, to build pipe lines, refineries and other equipment needed to keep pace with the demand for petroleum products, to install new methods of conserving oil and gas, to make improvements in existing plant and equipment and to take care of new products developed through research.

It is fortunate for the oil industry that at the moment its earnings are on a level that will enable it to meet a large part of the load without recourse to outside financing. By operating practically at capacity, oil company income has been substantially raised although the increase in product prices has been far less than the rise in other commodities. Some uninformed criticism has been directed at these higher earnings, but it must be borne in mind that many of the investments oil companies are required to make are not of a nature to appeal to outside investors, so it is a practical certainty that a major part of current earnings will go back into the expansion of facilities

OIL COMPANY USE OF PRIVATE PLANES IN PERIOD OF RAPID GROWTH



Stinson 4-place flying station wagon may be converted quickly from field passenger service to cargo carrier for emergency part delivery.

The helicopter is being studied for its possible superiority in exploratory work. At lower costs it would have advantages for pipeline patroling.

Standard of Ohio pilot Herman Spiller with pipeline map before taking off on inspection trip.

THE other day Gulf Oil Corp. needed some additional men for production development work at Kuwait. A plane was chartered, a group of 33 drillers, derrick men and engineers climbed aboard. Some thirty hours later the crew of 33 was half way around the world ready for work.

Refinery operations were being impeded at an Egyptian refinery because still tube failures had used up the entire surplus in stock. Several tons of new tubes were loaded into a transport plane and were in Egypt in less time than it normally would take to deliver them from a Pittsburgh mill to shipside at New York. Similarly drill pipe has been shipped by air to Alaska.

Not many months ago a well in Venezuela got away from drillers and was running wild. A cable to the Phillips Petroleum Company's home offices in the United States brought a crew of experts to the well site in a matter of hours.

Arabian American officials can visit their properties in the Near East and be back in New York on the company's big DC-4 as quickly as they could go to East Texas and back by train.

Officials and employees of companies in Oklahoma may take the regular morning flight to field or refinery in Texas, do a day's work and be back on the evening plane to have dinner with the family. Forty-hour train trips to New York dwindle to less than eight by company ship.

Oil companies in the United States have been users of planes for some personnel transportation and sales promotion work since the close of World War I, but in recent years use has grown with great rapidity. In addition to speedy long-distance transportation of personnel and equipment, the industry is saving time and money by the use of planes in exploratory work over land and sea and by routine inspection of properties such as pipelines. A majority of the larger companies now won and operate their own planes.

The large number of one-two seater capacity ships in use by the industry is an index to the extent that the plane has taken over the line walkers' function on the great system of crude and products lines. One of the pioneers in oil pipe line patroling from the air was Shell Oil Co. which began the practice in February, 1939. A gas line operator, Mississippi River Fuel Co., used planes for this purpose between Monroe,

Piper cub, a small plane of the type used for pipeline patrol and for personnel transportation to the field sites.

La., and St. Louis, even before Shell began.

At the moment Shell uses three small planes which cover 15,600 miles per month. One ship patrols lines in Texas and New Mexico from a base at Big Spring, Texas. Another covers Oklahoma, Kansas and Illinois lines from Tulsa. A third plane is kept in stand-by condition for use while others are in the hangar for their regular overhauls. Annual saving is $130,000 as compared with using line walkers. Line walkers would cost about 89 cents per mile of inspection, while planes do the job for less than one-fourth as much.

Standard Oil Co. of Ohio operates five products lines with 336 miles of pipe in Ohio and 992 miles of crude lines in Illinois, Indiana, Michigan and Ohio. Operating on a five-day week, Sohio's pilot, Herman Spiller, covers every foot of the company's lines every week. Sohio is one of the most recent companies to adopt the plane for pipe line patrol work, having purchased a small plane for that purpose last November. The company has owned one or more planes since 1929, however. Harry A. Sievers, Sohio's chief pilot, has safely carried passengers 1,600,000 miles for the company.

Cities Service Oil Co. of Delaware has made its headquarters at Bartlesville, Okla., convenient to parent company offices at New York, to refineries at Lake Charles, La., and Chicago, and to producing operations on the Gulf Coast, in New Mexico, the Panhandle and in Kansas.

The Texas Co. Grumman Gray Goose amphibian has been of great value in semi-marine operations in the Louisiana swamps.

Chief Pilot Bert Walker flies Cities Service engineers and executives 20,000 passenger miles monthly. In one recent month the plane was flown 15 days. It made 31 trips covering 7,084 miles carrying 76 passengers, an average of 2.6 passengers per trip. Passenger miles that month totaled 18,230. Cities Service passenger-mile costs average about 9.6 cents which is a little more than double the average passenger-mile cost by public conveyance. In that month, however, the company plane saved 243 office hours for executives plus a substantial sum for hotel bills.

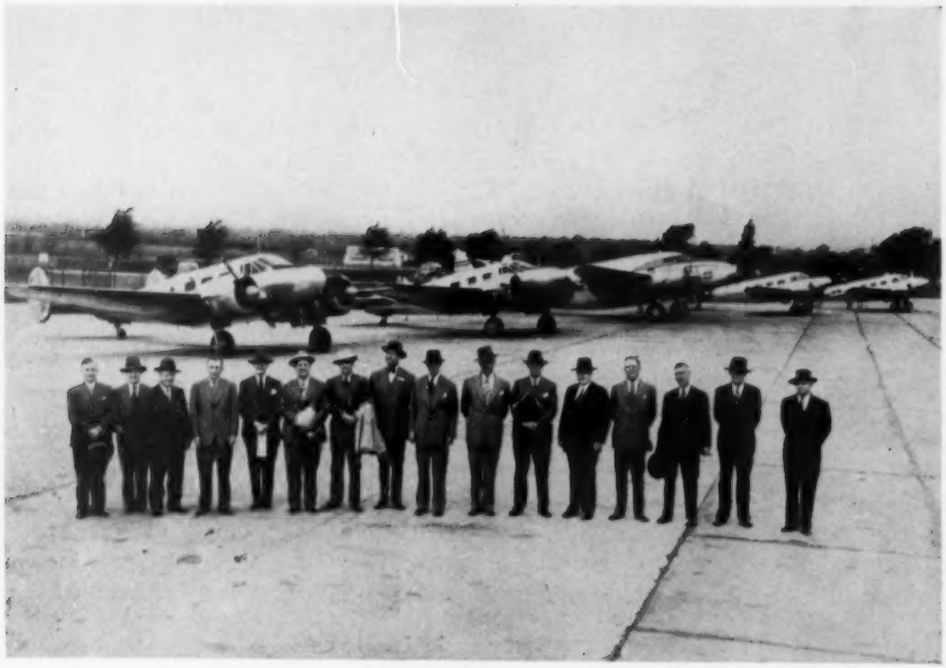
A considerable number of the planes operated by the industry are large units such as the C-47 or DC-3. Largest so far is the four-engine DC-4 delivered to Arabian American Oil Co. in March. This huge plane is equipped with long-range fuel tanks, special radio installations, over-water navigation aids and blind landing equipment. The cabin has three compartments including two staterooms with upper and lower berths. In daytime flights the ship can carry 32 passengers and at night can accommodate eight in the berths and 20 sit-up passengers.

American Management Association recently conducted a survey of the cost of company-owned planes for executive transport. Examples of costs were cited:

One company with a twin-engine plane of five-passenger capacity originally cost $62,500. Annual operating cost was nearly $60,000 including gas and oil, hangar rent, landing fees, storage, repairs and maintenance and all pilots' salaries and expenses. Total mileage per year was 123,981. Cost per mile was 46.77 cents. Passenger mileage was 253,312 with an average cost of 22.89 cents. The plane was in the air an average of 67 hours per month.

Another company with a $65,000 plane was able to keep it in the air 225 hours a month with an operating cost of $45 to $50 per hour. Still another company with a four-passenger ship kept the plane aloft 534 air hours per year carrying about 600 passengers on 180 flights. Total cost per air hour on this operation was $140.

A five-passenger plane costing $75,000 was operated 729 hours in 12 months carrying 531 passengers 153,090 miles. Cost per plane mile was



Standard Oil Co. of Indiana officials before a take-off in five company planes, one Lockheed Lodestar and four Beechcrafts, for an inspection of company properties.

37.3 cents and cost per seat mile 7.4 cents. Total gross cost of plane operation was $74 per hour.

Comparison of the above figures with those achieved by Cities Service make it clear that where seat occupancy is high and the plane kept in the air regularly, that out-of-pocket costs do not greatly exceed first-class public transportation and that office-hour savings are of great importance. The case for the plane in the petroleum industry is stronger than in some other industries because of the vast distances which oil men must travel to reach field and refinery.

Planes are being increasingly used for survey and aerial mapping, particularly in areas that are difficult of access by ground parties. A current undertaking in the field of exploration that has attracted wide attention is the survey of 40,000 square miles of relatively shallow ocean surrounding Bahama Islands which is being conducted by Aero Service Company for the group of oil companies holding concessions in that area. This survey is being made by use of the "flying magnetometer" which is towed by plane. The method was previously tested in land surveys and was used by the United States Navy in its reconnaisance work on the great Naval Reserve in Alaska. Adaptations of this method are being employed in South America and elsewhere.

Aerial photographic surveys have proved their value in various quarters of the globe. When the Royal Dutch-Shell Group obtained a concession to explore the western portion of New Guinea, one of the problems presented was the making of preliminary surveys in a region almost impenetrable by ground parties. Resort was had to aerial photography, and the whole area was carefully mapped from planes. It was found that even where jungle growth was so dense that it was impossible for the human eye to observe the configuration of the surface, the camera was able to reveal the contour clearly enough to serve as a guide to subsequent ground work. This was one of the early tests of the value of aerial mapping, and since that time it has come into general use in remote areas for providing geologists with a guide to further exploration.

Robert H. Ray Co. of Houston has been experimenting with the helicopter in geophysical exploration in swampy areas as a substitute for marsh buggies. Thus far the results seem to indicate a great saving in time and money. Preliminary work suggests that the helicopter can obtain 600 gravity meter readings per month at a cost of about $25 per station, which compares with a reported cost of up to $75 per station for marsh buggies in difficult areas.

Under favorable conditions the helicopter has enabled Ray company geophysicists to make a reading every five minutes. The calculated normal of 600 per month is based on 40 readings per day and 15 flying days per month. In its experimental work, Ray rented a helicopter at $75 per hour, guaranteeing 80 hours work per month. The rental cost included flying personnel and plane supplies and maintenance. Equipped with pontoons, the helicopter can operate in either water or on marshy ground.

Planes Operated by Representative Oil Companies

Company	Number of Planes 1-2 Passenger	3-6 Passenger	7 or more Passenger	Total
Andian Nat'l Oil Corp.	0	1	0	1
Arabian American Oil Co.	0	6	1	7
Atlantic Refining Co.	1	1	0	2
Bell Oil & Gas Co.	2	0	0	2
British-American Oil Prod. Co.	0	1	0	1
Carter Oil Co.	0	2	0	2
Champlin Refining Co.	0	0	1	1
Cities Service Oil Co.	1	1	0	2
Creole Petroleum Corp.	0	0	4	4
General Petroleum Corp.	2	1	0	3
Gulf Oil Corp.	9	15	5	19
Humble Oil & Refining Co.	7	1	3	11
Imperial Oil Ltd.	0	2	1	3
Intava, Inc.	0	3	2	5
International Petroleum Co.	0	1	2	3
Interstate Pipe Line Co.	0	1	0	1
Kerr-McGee Oil Industries Inc.	0	0	1	1
La Gloria Corp.	0	1	0	1
Lion Oil Co.	0	1	1	2
Magnolia Petroleum Co.	0	3	0	3
Ohio Oil Co.	3	2	0	5
Phillips Petroleum Co.	1	3	2	6
Premier Oil Refining Co.	4	1	0	5
Pure Oil Co.	0	5	1	6
Root Petroleum Co.	0	1	0	1
Shamrock Oil & Gas Corp.	0	1	0	1
Shell Oil Co.	4	4	1	9
Sinclair Oil Corp.	0	5	1	6
Skelly Oil Co.	0	1	0	1
Socony-Vacuum Oil Co.	2	21	1	24
Standard Oil Co. (Calif.)	0	1	4	5
Standard Oil Co. (Ind.)	0	6	1	7
Standard Oil Co. (N.J.)	0	1	2	3
Standard Oil Co. of N. J.	8	2	0	10
Standard Oil Co. (Ohio)	1	2	0	3
Sun Oil Co.	0	3	0	3
Taylor Refining Co.	1	1	0	2
The Texas Co.	0	14*	2	16
Tropical Oil Co.	0	2	0	2
Union Oil Co.	1	1	2	4
Union Producing Co.	0	1	0	1
Warren Petroleum Corp.	0	2	1	3
42 companies	47	111	39	197

* Four additional planes on order.

THE DELHI FIELD TODAY

By Dr. O. W. Willcox

Dykes around field storage tanks and board roads to well locations are made necessary in the Delhi area by swampy conditions.

SOON after the discovery of oil in the Delhi field, it was recognized as the first important find yet made in northeast Louisiana, and its subsequent history has confirmed the first impression. The total production as of January 1, 1947, has amounted to 7,626,997 barrels. The estimated ultimate recovery is 200,000,000 barrels.

The field as a whole is divisible into three parts, referred to as the Delhi, the West Delhi and the Big Creek fields, and comprises a belt of production about thirteen miles long and one to two miles wide. This belt is located in Richland, Madison and Franklin Parishes, in a geographical position about midway between Monroe, La., and Vicksburg, Miss. Geologically the productive area lies on part of the south flank of a broad structure known as the Monroe Uplift or Sharkey Platform. The discovery well is about three miles west and a little south of the town of Delhi, La., and the general topography is that of a level alluvial area, with surface elevations ranging from 50 to 100 feet; average 85-90 feet.

Reasons for drilling in this area were based on general geological knowledge of the regional structure. From the standpoint of exploring for oil, the intriguing fact was the known or suspected existence of an underlying eroded surface of Lower Comanchean age overlaid by later formations. Between these two divisions of the geological column, there should be found an unconformity, with the older, lower rocks dipping at a steeper angle than the younger, upper rocks. These sub-surface studies suggested that the lower beds would be truncated and overlaid by younger beds, presenting conditions favorable to "pinchouts" or structural traps. Seismic exploration lent conformation to this difference in dips. The original well was located on a structural feature found by seismic work. Subsequent drilling showed oil accumulation due to a stratigraphic trap in truncated formations of the Tuscaloosa and Paluxy formations, at the angular unconformity of the Upper and Lower Cretaceous. The local structure on which the discovery well was drilled had no significance to the accumulation of oil in the Delhi field.

From drilling data now in hand, the composition of the geological column is seen to be as follows:

Formation	Thickness of Beds
Recent & Alluvium	0-200′
Cockfield, Cook Mtn., Sparta, Cane River	1600′
Wilcox	1000′
Midway (Clayton Chalk at base)	400′ + (15′—20)
Monroe Gas Rock (Upper Cretaceous)	5-10′
Tuscaloosa	0-350′
Paluxy (Lower Cretaceous)	0-300′
Upper Glen Rose	600-700′
Massive Anhydrite	180′
Lower Glen Rose	1200′
Hosston	1000′ +

The oil is considered to be of Tuscaloosa origin, with a common reservoir of the Basal Tuscaloosa and the truncated Paluxy sands. The Paluxy and other Comanchean sands up-dip from the Tuscaloosa truncated zone are unproductive, probably because they are not connected with the Tuscaloosa beds.

The normal down-dip of the Tuscaloosa is 700-800′ per mile; of the Paluxy it is 800 or more. Locally these dips appear to be less accentuated. Several deep wells drilled for correlation purposes (5,776 ft.) have been bottomed in massive anhydrite. Igneous dikes and sills of the intrusive type, which were quickly cooled, have been noted; also stocks and plugs (some weathered material) have been noted, along with water-lain volcanics. There is some minor faulting in the Tuscaloosa, and there is probably a major fault between the Delhi and the West Delhi fields in the Lower Cretaceous beds (pre-Middle Glen Rose).

In Delhi Field the producing sands occur within the Tuscaloosa (Upper Cretaceous) and Paluxy (Lower Cretaceous). Producing Tuscaloosa sands include stray sands of the Marine Tuscaloosa and also the basal member, or Massive Tuscaloosa, locally called the Barrier sand. (See Charts). The Barrier sand is widespread and lies unconformably over the beveled and truncated Lower Cretaceous. Due to the fact that the Tuscaloosa beds dip southeastward at a lesser rate, in general, than the underlying Lower Cretaceous beds, different sands of the Lower Cretaceous, or Paluxy, will come in contact with the Barrier sand; thus, any Paluxy sands contiguous to the Barrier sand should have, and have been found to have, common water levels and common reservoir characteristics. Sands having a common connection and listed within the so-called Holt reservoir, are: (1) Barrier sand (or Basal Tuscaloosa Sand), (2) Paluxy "A" Sand, (3) Murphy Sand, (4) Holt Sand, (5) Other Paluxy sands immediately above or below the Holt Sand. In the West Delhi field the Paluxy "B" sand is adjacent to the Basal Tuscaloosa or Barrier sand, creating a common reservoir; in West Delti, the Tuscaloosa and Paluxy sands are classified as the Bryant zone, but due to the fact that the Barrier sand carries across from the Delhi into the West Delhi field, the

Holt zone and the Bryant zone are, in effect, one reservoir.

Several stray Tuscaloosa sands above the Barrier, one of which is the May sand, have no connection with the Barrier sand and are separate reservoirs. Many of these stray sands give indication of being gas expansion reservoirs as opposed to the Barrier and Holt sands, etc., which are water driven.

In the northwestern part of the West Delhi field some oil-saturated Upper Glen Rose sands have been encountered, indicating that the Upper Glen Rose sands are in contact with the Tuscaloosa at certain places where the Paluxy has been truncated. Thus in addition to Tuscaloosa and Paluxy, there is some production in the area in beds older than the Paluxy.

Big Creek field producing sands are considered as being within the Marine Tuscaloosa Age with the Basal Tuscaloosa or Barrier sand not being present, this latter having been overlapped. In the Big Creek field, Marine Tuscaloosa beds rest on Upper Glen Rose, but to date no Upper Glen Rose sand members in this field give evidence of oil in commercial quantities.

Delhi and West Delhi wells in the Holt and Bryant zones, as defined by the Louisiana Conservation Commission, have a common water level approximating subsea 3286 feet. There appears to be a gas cap in one small portion of the field around and north of the Murphy-Sun, Holt No. 1 discovery well, with an approximate gas-oil level at subsea 3130 to 3135 feet. Other wells farther west of this localized gas cap area have produced oil with low gas-oil ratios at much higher structural positions, indicating a possible disconnected gas area in the Barrier and Holt sands. However, these sands have a common water level, indicating effective connection with the water-filled portion of the reservoir despite the variation in gas-oil levels. The formational salt water chloride content is about 54,000 parts per million.

The oil accumulation of Delhi and West Delhi field is in a series of truncated Tuscaloosa and Lower Cretaceous sands. Accordingly, the fields represent a stratigraphic or truncated sand production rather than a structural fold accumulation. To complicate matters, there is overlap, coupled with some probable faulting and considerable variation in sedimentation laterally. The limits of the Delhi and the West Delhi fields will be demarked by the water levels on the south and east, by the truncation line on the north, and by the lensing out of the sands by overlap on the west and southwest.

Summarizing, it is concluded that the oil production from the Delhi and West Delhi fields is of a stratigraphic trap type with local structure playing no insignificant part. The Big Creek field likewise is a stratigraphic trap accumulation with lensing sands and overlap limiting production.

On a lithological basis the oil-producing zones are classified as follows:

Holt Zone (Delhi field): Barrier sand (Basal Tuscaloosa); Paluxy "A" sand zone; Murphy sand; Holt sand.

May Zone (Delhi field): May sand; Libby sand; Robinson sand. Among identified stray sands are the Baughman sand, Beaird sand, downdip gas sands as the Munholland and Ruple, and various others.

Bryant Zone (West Delhi): Barrier sand; Paluxy "B" sand zone; Mengel sand zone; Z or Evans sand.

Big Creek Zone (West Delhi): Howard sand; Price sand (includes Smith sand); Williams zone; Parker sand; stray Tuscaloosa sands (including Myrtle Hubbard sand and some Upper Glen Rose sands).

By order of the Louisiana Conservation Commssion dated April 1, 1947, the following daily allowables were put into effect:

Zone or Sand	Augmented Allowable (Bbls.)	Acres Allocated	Number of Wells
Bryant	6,792	2,492	66
Holt	14,171	5,200	129
May	1,309	732	17
Price	2,379	528	27
Parker	90	20	1
Howard	812	180	9

The total number of wells in this list is 249. Supplementary data supplied by A. S. Rhea, Sun Oil Co., bring the total number of oil wells in the Delhi and West Delhi fields to 246, gas wells, 4; dry and abandoned wells 25; in the Big Creek field are 76 oil wells, 8 gas wells and 23 dry or abandoned, making a grand total of 362 wells (as of April 4, 1947). Production here is now being carried on by a total of 26 operating companies and firms, some of which have wells in more than one zone. The largest operators in the six fields above named are the Murphy-Sun Oil Co., with 143 wells; Stanolind Oil and Gas Co., with 13; American Liberty Oil Co., with 28; Gulf Refining Co., with 17. The remaining 145 wells are divided among 22 operators, some of whom have only one well.

Holt Zone: The discovery well for the Holt zone, which was also the first to be drilled in the Delhi field, is the Murphy-Sun J. E. Holt No. 1, which was brought in on December 9, 1944. This zone consists of Basal Tuscaloosa sand (Barrier sand) and a number of Paluxy sands, including the "A" sand zone, the Murphy sand and the Holt sand. The porosity is around 30 percent. The gas-oil contact is at —3130 feet to —3135 feet in isolated portions of the field. The oil-water contact is at —3286 feet. The average original bottom hole pressure at a datum of

Fig. 1—General map of Big Creek Delhi areas showing wells used in east-west north-south cross sections below. →

—3135 feet was 1530 pounds per square inch. The average bottom hole pressure as of October 1, 1946, at a datum of —3135 feet, was 1483 psi, with a total drop of 47 pounds in a little less than two years. The pressure drop has been constant, especially so during the last several months with the pressure drop being from three to four pounds per month. The gas-oil ratio in the Holt zone has increased from an average of 400 to 1 to 450 to 1 since the discovery. From these data it appears that the Holt zone is water driven. Here the gravity of the oil is 41-42°

May Zone: The May zone consists of lenticular sands lying above the Barrier sand, with which it is not connected. This zone is regarded as divided into the May sand, the Libby sand and the Robinson sand. These sands are probably not effectively interconnected.

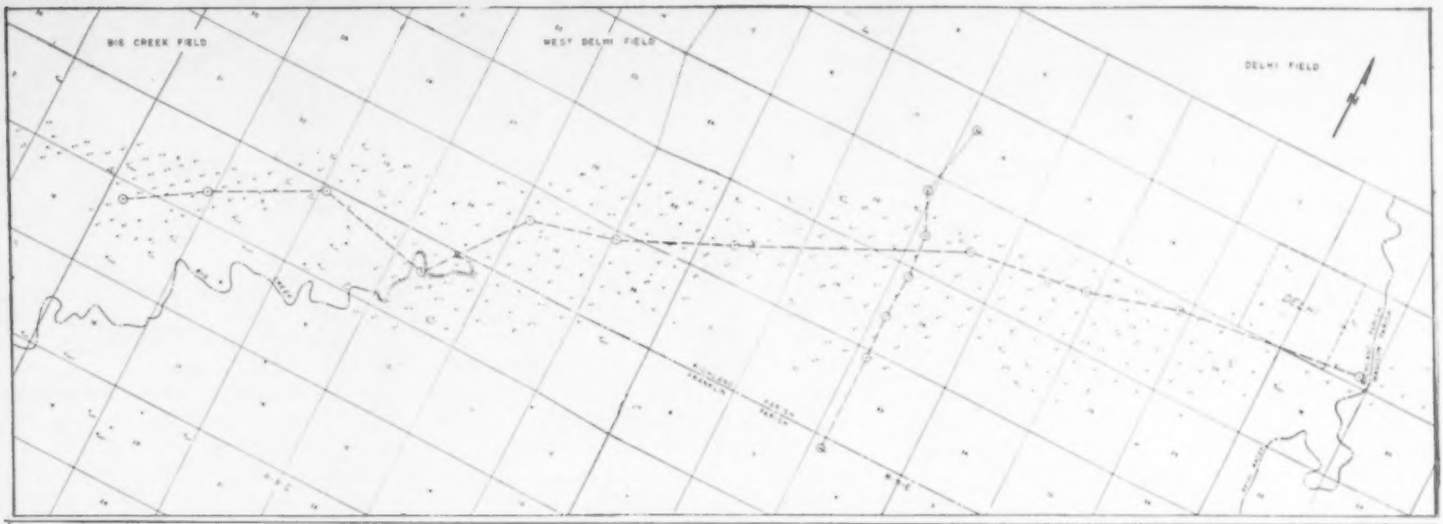
The discovery well for the May sand is R. Lacy-D., May No. 1, which was brought in on March 23, 1945. The gas-oil contact is at —3190 feet (in Murphy-Sun Mayes No. 3). There has been no observed oil-water contact in the lowest producing May sand well (the Murphy-Sun Abrams-McEacharn) which reached —3424 to —3433 feet.

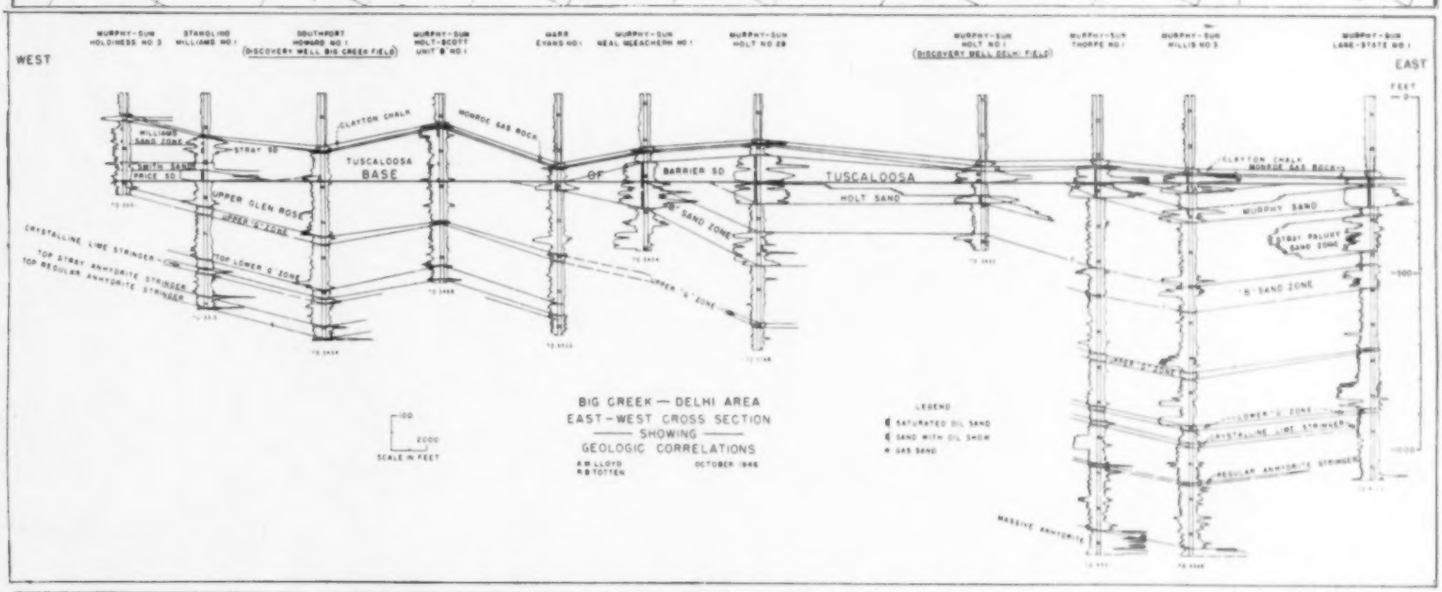
The average orginal bottom hole pressure in the discovery well was 1556 psi at a datum of —3300 feet. The average as of October 1, 1946, at a datum of —3300 feet, was 1049 psi, with an average drop of 507 psi. The pressure drop in the May sand is considerably greater than in the Holt zone, and also the gas-oil ratio has increased greatly, with the original gas-oil ratio which was 300 to 1, now averaging 800 to 1 and still climbing. It appears that the May sand is a gas expansion reservoir. The oil has a gravity of 40° API.

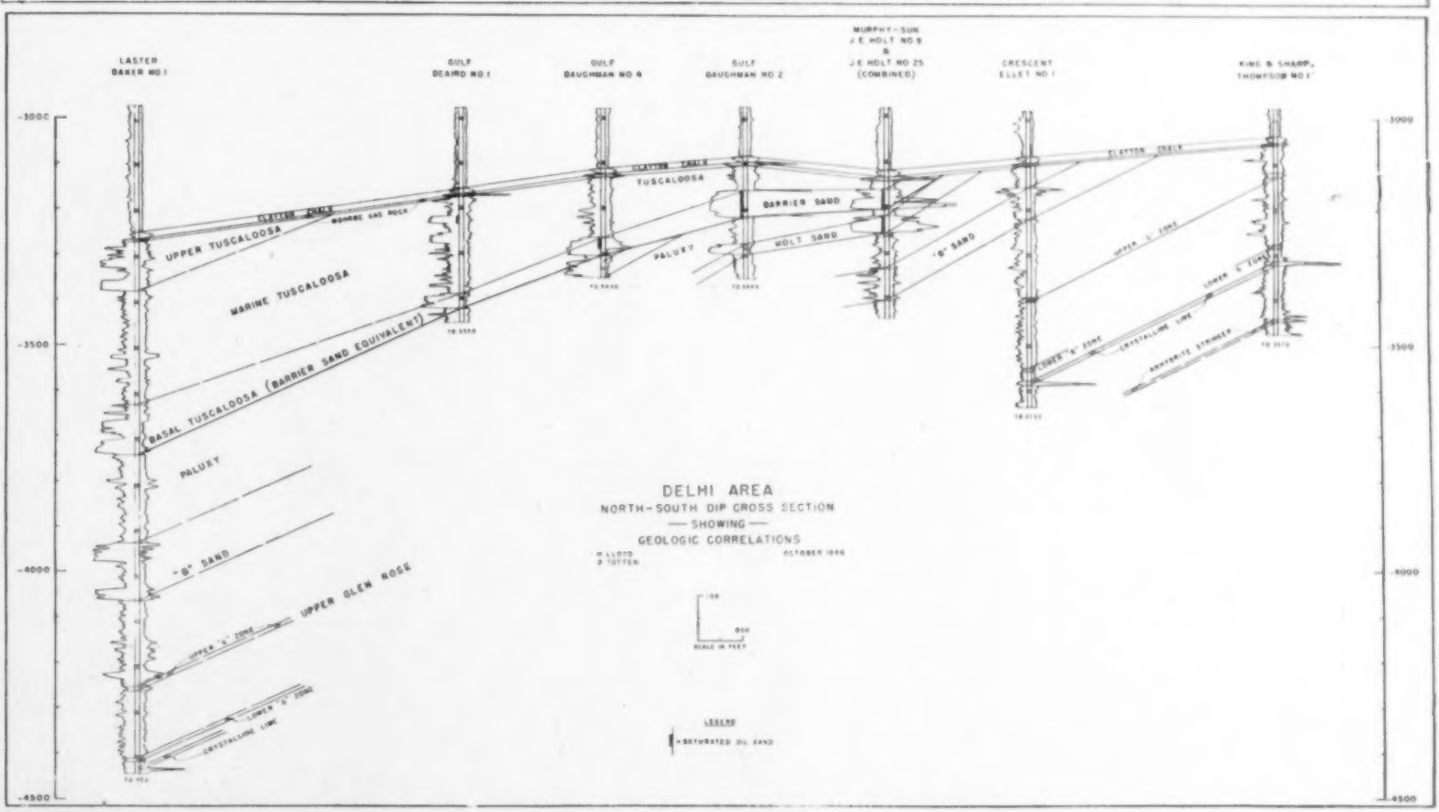
The discovery well of the Libby sand of the May zone was Amerada-Libby No. 1, brought in on July 30, 1945. The gas-oil contact is at approximately 3216 feet in the Kemp & Caraway Snider A-2. No oil-water contact has been observed. (Lowest producing sand well is Murphy-Sun-Kulhaway No. 1 at —3409 to —3415 feet.)

The average original bottom hole pressure in the Libby sand, at a datum of —3300 feet was 1582 psi. The average current, on Oct. 1, 1946, bottom hole pressure at a datum of—3300 feet was 1410 psi. The original gas-oil ratio was 230 to 1; the present gas-oil ratio is about 500 to 1 and is still increasing. The Libby sand is reacting similarly to the May sand, except that the initial and current bottom hole pressures are higher than in the May sand. The Libby sand, like the May, is probably a gas expansion sand.

The discovery well of the Robinson sand in the


BIG CREEK FIELD
WEST DELHI FIELD
DELHI FIELD


WEST
EAST
MURPHY-SUN HOLDINESS NO 3
STANOLIND WILLIAMS NO 1
SOUTHPORT HOWARD NO 1 (DISCOVERY WELL BIG CREEK FIELD)
MURPHY-SUN HOLT-SCOTT UNIT B NO 1
WARR EVANS NO 1
MURPHY-SUN NEAL BLEACHERY NO 1
MURPHY-SUN HOLT NO 29
MURPHY-SUN HOLT NO 1 (DISCOVERY WELL DELHI FIELD)
MURPHY-SUN THORPE NO 1
MURPHY-SUN WILLIS NO 3
MURPHY-SUN LANE-STATE NO 1
WILLIAMS SAND ZONE
STRAY SD
SMITH SAND
PRICE SD
CLAYTON CHALK
MIDDLE GAS ROCK
TUSCALOOSA BASE OF
BARRIER SD
TUSCALOOSA
HOLT SAND
UPPER GLEN ROSE
UPPER 'A' ZONE
CRYSTALLINE LIME STRINGER
TOP STRAY ANHYDRITE STRINGER
TOP REGULAR ANHYDRITE STRINGER
TOP LOWER 'A' ZONE
'A' SAND ZONE
LOWER 'A' ZONE
MURPHY SAND
STRAY PALUXY SAND ZONE
'B' SAND ZONE
UPPER 'C' ZONE
LOWER 'C' ZONE
CRYSTALLINE LIME STRINGER
REGULAR ANHYDRITE STRINGER
MASSIVE ANHYDRITE
FEET
-0
-500
-1000
100
2000
SCALE IN FEET
BIG GREEK — DELHI AREA
EAST-WEST CROSS SECTION
— SHOWING —
GEOLOGIC CORRELATIONS
A M LLOYD
R B TOTTEN
OCTOBER 1946
LEGEND
SATURATED OIL SAND
SAND WITH OIL SHOW
GAS SAND


LASTER BAKER NO 1
GULF DEARD NO 1
GULF BAUGHMAN NO 4
GULF BAUGHMAN NO 2
MURPHY-SUN J E HOLT NO 9 & J E HOLT NO 25 (COMBINED)
CRESCENT ELLET NO 1
KING & SHARP. THOMPSON NO 1
-3000
-3500
-4000
-4500
CLAYTON CHALK
MIDDLE GAS ROCK
UPPER TUSCALOOSA
MARINE TUSCALOOSA
BASAL TUSCALOOSA (BARRIER SAND EQUIVALENT)
TUSCALOOSA
BARRIER SAND
HOLT SAND
PALUXY
'B' SAND
UPPER GLEN ROSE
UPPER 'A' ZONE
LOWER 'A' ZONE
CRYSTALLINE LIME
ANHYDRITE STRINGER
UPPER 'C' ZONE
LOWER 'C' ZONE
DELHI AREA
NORTH-SOUTH DIP CROSS SECTION
— SHOWING —
GEOLOGIC CORRELATIONS
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OCTOBER 1946
100
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SCALE IN FEET
LEGEND
SATURATED OIL SAND

May zone was Sohio-Robinson No. 1, brought in on June 30, 1945. The gas-oil contact is unknown (oil was found at —3216 feet). The oil-water contact is also unknown (the lowest depth reached was —3288 feet in Sohio-Jynes No. 1). Neither the original nor the current bottom hole pressure is known. The original gas-oil ratio was 440 to 1; the current ratio is not recorded. The character of this reservoir is not known, but it probably comes under the classification of gas-expansion.

The discovery well of the Baughman sand was Gulf-Baughman No. 6, brought in on March 24, 1946. The gas-oil contact is unknown, but is probably at approximately —3255 feet to —3260. Data on original and current bottom hole pressures are not available. Oil from the Baughman sand is 51° API.

The discovery well of the Beaird sand of the May zone was Gulf-Beaird No. 1, brought in June 13, 1946. The gas-oil contact is between —3171 and —3217 feet; the oil-water contact is unknown, and no data on original or current bottom hole pressure are available. The original gas-oil ratio was 538 to 1; no data are available on the current ratio. The oil from this sand is of 51° API gravity.

Bryant Zone: The main producing horizon of the West Delhi field is the Bryant zone. The discovery well was the R. J. Caraway Bryant No. 1, brought in on September 1, 1945. This zone consists of the basal Paluxy sand, known as the "B" sand; it includes also the Barrier sand and other Tuscaloosa sands contiguous to the "B" sand. The Mengel sand of the Upper Glen Rose is also considered to be in the Bryant zone. The average porosity is 30 percent.

Oil was found at —3025 feet, but no gas-oil contact was observed. There is an oil-water contact at —3286 feet. The average original bottom hole pressure at a datum of —3135 feet was 1528 psi. The average current on October 1, 1946, bottom hole pressure, at a datum of —3135 feet, was 1459 psi, showing a pressure drop of 49 psi. The gas-oil ratios are increasing at the same rate as in the Holt zone, and the gas-oil ratios are similar. The Bryant zone seems to be of water drive nature, and it also appears to have similar reservoir characteristics to the Holt zone, as would be expected. The gravity of the oil is the same as in the Holt zone, 41°-42° API.

The "Z" or Evans sand of the West Delhi field is included in the Bryant zone. The discovery well was American Liberty and Murphy-Sun No. 1 Mengel-Evans brought in April 10, 1946. The gas-oil contact is at —3040 to —3044 feet (in another well —3046 feet). The oil-water contact is in a sand (in the southwest) that was reached at —3156 feet. Data on original or current bottom hole pressures are unavailable. The original gas-oil ratio was 3640 to 1; the current ratio is in excess of 10,000 to 1. The gravity of the oil is 38.2° API. The "Z" sand lies immediately above the upper "G" zone.

Price Sand: At present the most promnent producing horizon of the Big Creek field is the Price sand, which consists of the lowest Tuscaloosa sand in much of the field. The discovery well of the Price sand was Bering-Price No. 1 in SE, NW, Sec. 5-16N-8E. The average porosity is 32 to 35 percent. No gas-oil contact has been established but is probably at about —2775 feet; the oil-water contact is indefinite but is at about —2901 to —2911 feet.

The average original bottom hole pressure at a datum of —2800 feet was 1365 psi. The average current, on October 1, 1946, bottom hole pressure, at a datum of—2800 feet, was 1320 lbs. or a 45 pound drop. The original gas-oil ratio was not recorded; the present average gas-oil ratio has increased very slightly in the Price sand, suggesting that it may be a water drive sand.

There is a Smith sand which grades into the Price sand in some updip wells and appears to be part of a common reservoir. The Price sand is of younger age than the Barrier sand, which is not present in the Big Creek field. (It is overlapped.)

Howard Sand: This sand consists of lenticular sands which may be the time equivalent of the Price sand but not interconnected. The discovery well of this sand (which was also the Big Creek discovery,) was Southport-Howard No. 1. Neither the gas-oil nor water-oil contacts are known.

The average original bottom hole pressure at a datum of —2800 feet was 1360 psi, + or —. The average current, on October 1, 1946, bottom hole pressure, at a datum of —2800 feet, was 1086 psi. The current average gas-oil raio is 725 to 1 with gas-oil ratio on July 1, 1946, being equal to 432 to 1. The original gas-oil ratios are not recorded. Due to the fact that the gas-oil ratios have increased considerably in the Howard sand, it appears that the Howard sand is a gas expansion sand and is apparently not connected with the Price sand.

Williams Zone: This is a series of lenticular sands in the Big Creek field. The discovery well was Sellers-Williams No. 1, in NW NE Sec. 7-16N-SE. Incomplete data for this sand indicate an average current bottom hole pressure (at a datum of —2800 feet) of 1100 psi. Other data are lacking for this sand. It is probably a gas-expansion sand.

Parker Sand: This is a thin lenticular sand of little importance. The discovery well was Murphy-Sun Parker No. 1, NE NW Sec. 4-16N-SE. The porosity is 25 percent and gravity of the oil 40°.

Myrtle Hubbard Sand: This is also a thin lenticular sand lying at about 50 feet above the Howard sand. It was discovered by Skelly Oil-M. Hubbard No. 1, SE SE, Sec. 33-17-N-SE.

There are some other stray Tuscaloosa sands between the Williams zone and the Smith-Price sand zone, such as in the Ober lease. A stray Upper Glen Rose sand immediately above the "G" zone produces some oil in the Big Creek field. This sand is apparently in contact with the Price sand. In addition to the above-mentioned stray Tuscaloosa sands in the Delhi field, the following have been listed:

Woods-Munholland No. 2 sand (gas)
Caraway-Ruple No. 1 sand (gas)
American Liberty-Kny (Dixon) No. 1 sand (gas)
Rudco-Drexler No. 1 sand (gas)
Murphy-Sun, Holt No. 40 sand (oil)
Murphy-Sun, Holt No. 16 sand (oil)

There may possibly be a few other unlisted sands.

The spacing in the Delhi and West Delhi fields is 40 acres, with 200 feet tolerance from center. In the Big Creek field it is 20 acres (east-west twenties). Wells in the NW and SE are on 10-acre tracts, with 50 feet tolerance. The maximum allowable gas-oil ratio is 1000 to one.

As regards outlets, the Sun Oil Co. has a pipe line from the field to the Mississippi River. The oil is taken by barges from this terminal.

The following figures show the cumulative production in barrels from the beginning to January 1, 1947:

Delhi-West Delhi (First production December, 1944)		Big Creek (First production, 1945)	
1944	72,200		
1945	1,039,200	1945	46,300
1946	5,545,000	1946	895,800
Total	6,656,400	Total	942,100

The combined cumulative production to January 1, 1947 is 7,598,500 barrels. By order of the Louisiana Conservation Commission, the daily allowable for the Delhi field is 109 barrels per well; for the Big Creek field, 90 barrels per well. The cumulative water production to January 1, 1947 is 147,002 barrels; of gas, 3,550,-981 M. cu. ft.

To utilize Delhi's large output of natural gas, produced with the crude oil and to stop the flaring of this potentially useful product, the Murphy-Sun interests are constructing a liquid hydrocarbon extraction plant embodying the most up-to-date engineering features in its equipment and operation. The plant has been designed and will be erected by Petroleum Engineering Inc. and is located two miles west of the town of Delhi on the line of the Illinois Central Railroad and on United States Highway 80. It will be

capable of handling all the gas from the Delhi, West Delhi and Big Creek fields. Incidentally it will be the first natural gasoline plant to be built and operated by Sun Oil Company, although the company has participated in other similar developments.

In this connection it should be added, however, that, while Sun and Mr. C. F. Murphy, Jr., who together have much the largest holdings in the field are jointly underwriting and carrying out the project, the opportunity to participate in it and to share in its benefits is being extended to the other producers in each of the three fields, of whom there are a considerable number. Each of these, if he so desires, may invest in the enterprise in exact proportion to his percentage of acre-feet of oil sand. The advantage in so doing is that those who join presumably will receive a higher return through their share in the proceeds of the plant's products than they would by sale of their gas under the standard natural gasoline contract. The offer is not an attempt at unitization of the fields. It was decided upon by the management as the fairest way of carrying out a conservation measure such as this. Many of the smaller producers have announced their intention of accepting the offer.

Preliminary work of grading and preparing the site of the plant has been completed, and structural construction which has been held back by delays in supplying material, particularly the line pipe for the gathering system, is now beginning. While the plant is going up, this gathering system, which extends a distance of some fifteen miles from east to west and requires pipe from 24-inch diameter down, will be laid. The completed plant is expected to be ready for operation around the first of the coming year.

Total processing absorption and gathering capacity of the plant will be 17 million cubic feet daily. Compressor capacity at the start will be 14,360,000 cubic feet. The plant is designed for 60 percent propane recovery and 95 percent butane recovery with all the heavier hydrocarbons. Production as planned is estimated at 20,200 gallons of propane, 28,000 butane and 21,300 debutanized natural gasoline per day. Sufficient fractionation is provided to make any grade of gasoline from debutanized gasoline up to a higher vapor pressure natural. It will be possible to make butane and propane separately or a mixture of the two.

Separators in the field will be operated at eight pounds or less. Compressors will gather the gas at 8.8 pounds absolute and boost it in three stages to 565 pounds absolute. Four Cooper-Bessemer compressors of 1,000 horsepower each will handle this part of the work. The power plant will consist of three Wickes water tube induced draft boilers of 150 horsepower at 375 pounds pressure with provision for superheating 100 degrees. Electric power will be purchased from the Louisiana Light and Power Company. All heat exchanger equipment will be shell and tube with no open sections. All control instruments will be of the latest type with air and electronic controls. This dehydrating plant will be of the solid absorbent type. J. F. Pritchard & Company will construct the induced draft cooling tower.

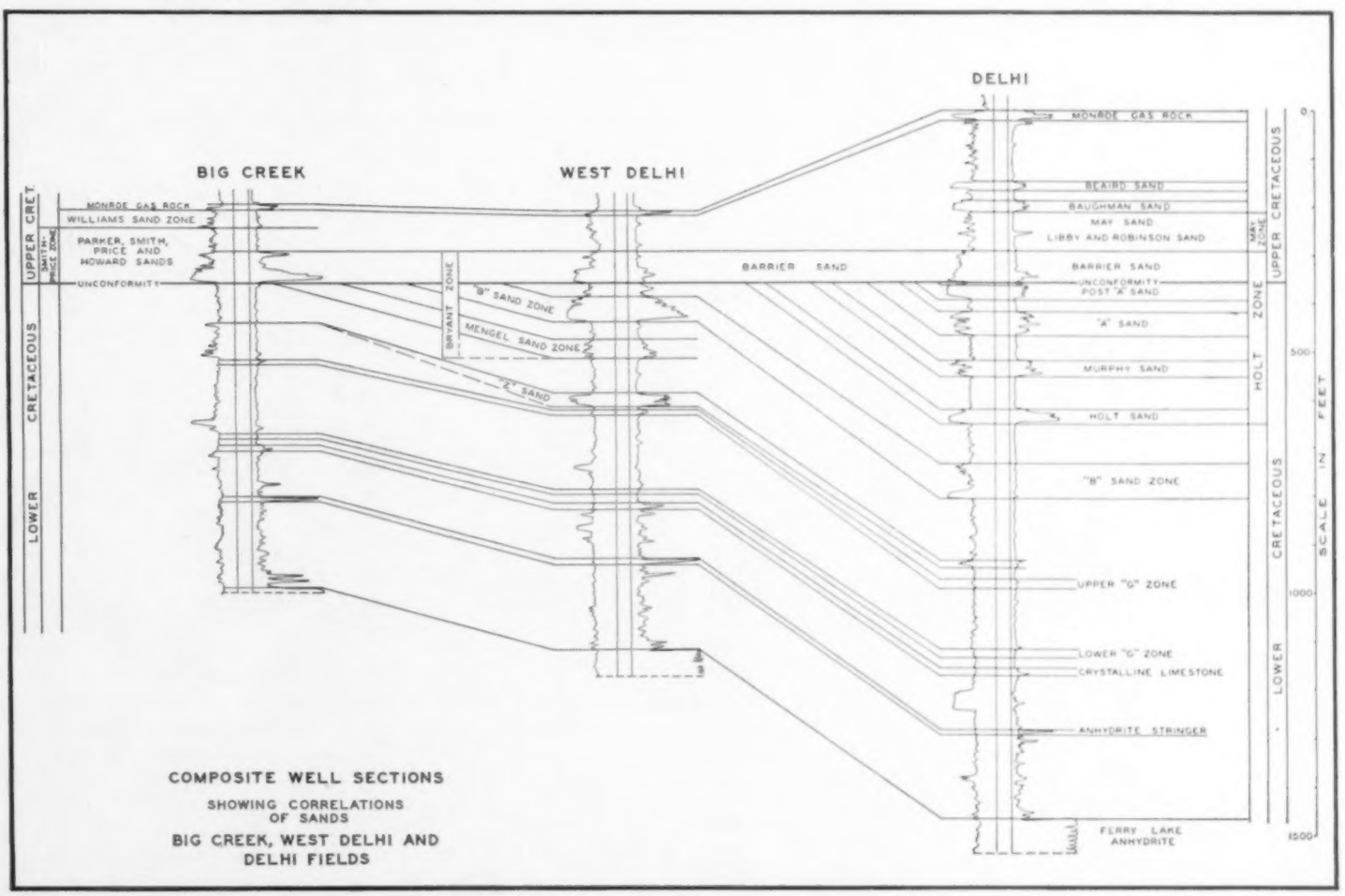
Storage for 20,000 barrels of natural gasoline and 10,000 barrels of butane will be provided by Horton spheroids. For propane storage, A. O. Smith Company will install ten horizontal tanks 8 x 72 feet holding roundly 6,500 barrels.

After processing and dehydrating, finished products will be ready for delivery by tank car or tank truck for shipment and sale to a gas transmission company.

Cost of the completed installation will be about $3,250,000 including $2,250,000 for the plant itself, $750,000 for the gathering system and $250,000 for other appurtenances.

Acknowledgement

This paper was compiled from notes and drawings kindly furnished by Messrs. A. M. Lloyd, F. E. Heath and Robert B. Totten, of the Sun Oil Company. Information regarding the natural gasoline plant was supplied by the company's Natural Gasoline Department.

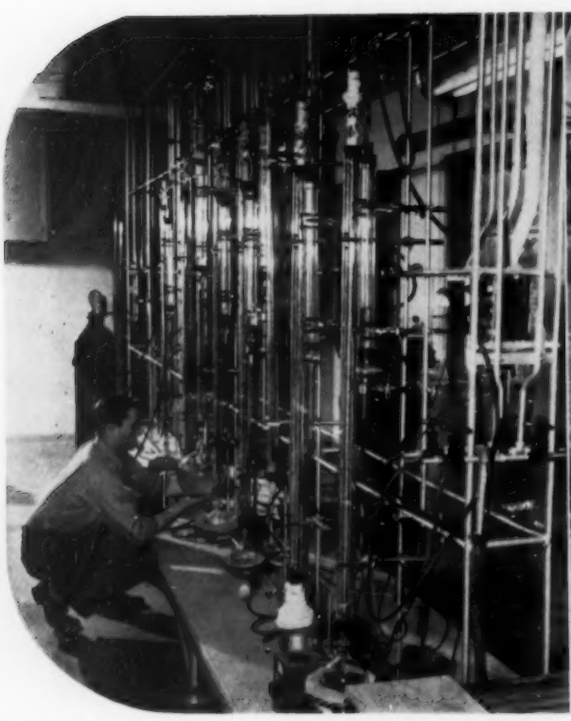


COMPOSITE WELL SECTIONS
SHOWING CORRELATIONS OF SANDS
BIG CREEK, WEST DELHI AND DELHI FIELDS

THE MANUFACTURE OF SYNTHETIC GASOLINE*

By

GEORGE ROBERTS, JR., and J. A. PHINNEY**



Fractionating columns in analytical building.

Flow meters for small reactor at Synthol pilot plant, Tulsa, Okla.

THE manufacture of synthetic gasoline currently under development is rapidly nearing commercial application in this country. This process, derived from the German Fischer-Tropsch process and variously designated the Synthol process, the Synthene process and the Hydrocol process, has been described extensively in recent periodicals from the standpoint of the chemistry and process features involved.

The basic reaction in the manufacture of synthetic gasoline is the combination of hydrogen and carbon monoxide to form hydrocarbons and water (synthesis gas) as shown in the equation. $8CO + 16H_2 = C_8H_{16} + 8H_2O$. This reaction was first reported in 1926 by two German scientists, Frantz Fischer and Hans Tropsch, who found that if water gas, consisting predominantly of hydrogen and carbon monoxide, was passed through a bed of iron particles impregnated with alkali, condensible hydrocarbons could be recovered from the effluent gases. Obviously, any material which can be made to yield carbon monoxide and hydrogen can serve as a raw material for the manufacture of synthetic gasoline,

[*This paper gives an outline of the main features of the American-designed process for manufacturing gasoline from natural gas. As will be seen, the engineering problems are unique in certain respects.*]

and the selection of raw material depends primarily on the economics of the synthesis gas manufacturing step.

In 1938 a total of nine Fischer-Tropsch plants were operating or under construction in Germany, the total capacity of which was about 11,500 B/D of oil. The basic raw material for this process was, of course, coal which was converted to water gas containing hydrogen and carbon monoxide by reaction with steam as shown in the equation, $12C + 16H_2O = 8CO + 16H_2 + 4CO_2$.

The investment cost for commercial synthesis plants in Germany was high, being of the order of $7500 to $8000 per daily barrel of product. In addition, the operating labor requirement per unit of product was excessive, because of the large numbers of reaction vessels, each requiring close attention and control. These two factors, together with the low efficiency of conversion of coke to gasoline, combines to make the cost of production of synthetic oil according to the German technology so high that it is not competitive with natural petroleum products at current prices.

American Process Uses Natural Gas

Insofar as the American development of the synthetic gasoline process is concerned, active interest in this country arose in 1938, although earlier investigations had been carried out on a minor scale. It was recognized at that time that for synthetic gasoline to win a place in the competitive American petroleum picture, enormous improvements in efficiency and reduction in investment and operating cost through improved engineering over the German process would be imperative. It was first decided that natural gas under the present price structure was a more economic source of carbon and hydrogen than coal, and research was undertaken to establish a feasible means for the conversion of natural gas into hydrogen and carbon monoxide. In the following equation, methane reacts with steam and carbon dioxide to form carbon monoxide and hydrogen: $6CH_4 + 4H_2O + 2CO_2 = 8CO + 16H_2$. This reaction is carried out at atmospheric pressure and about 1500°F. over catalyst,

* Abridged from paper presented before American Society of Mechanical Engineers, Tulsa, 1947.

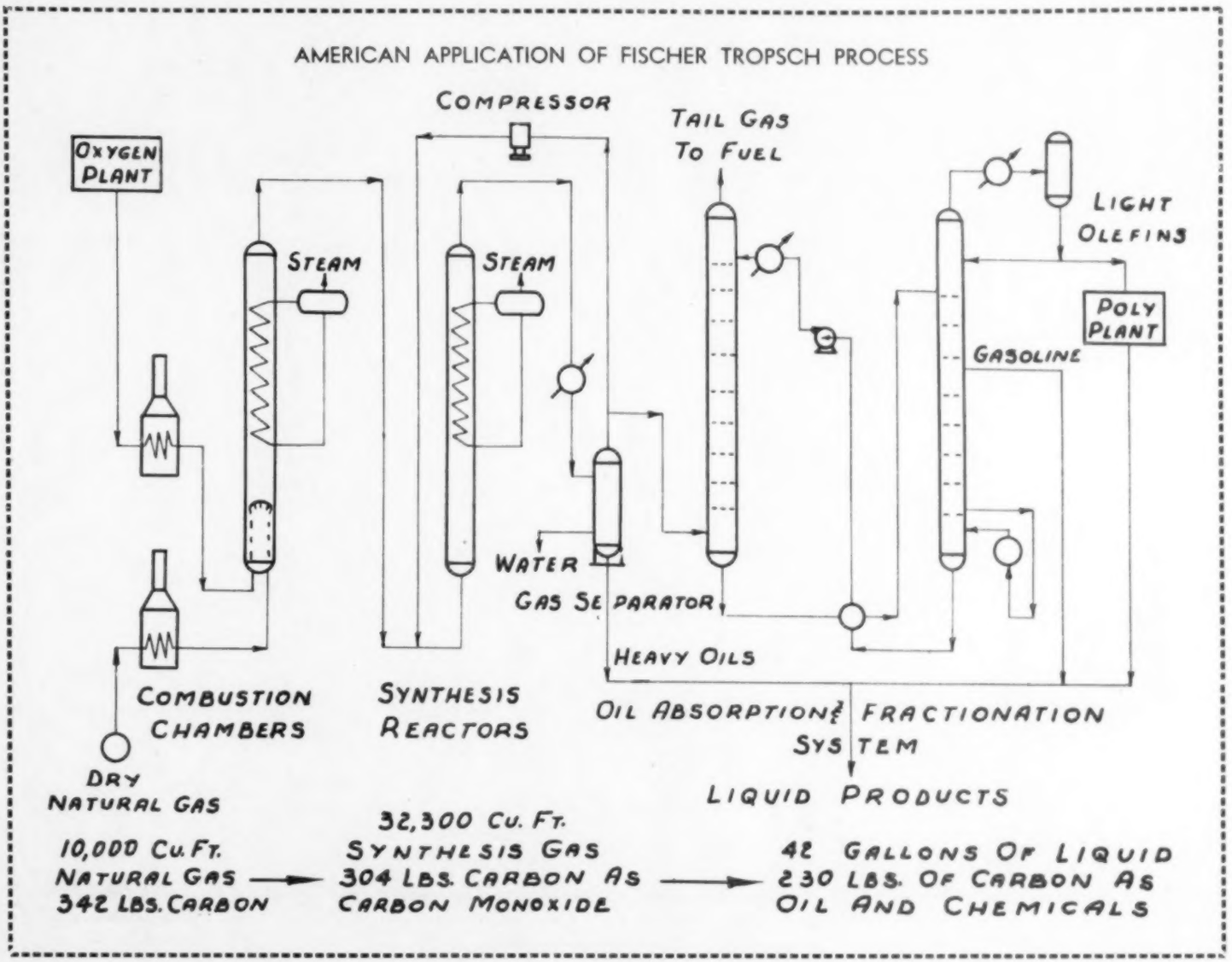
** Research Department, Stanolind Oil & Gas Co., Tulsa.

and since it requires heat, it is commercially carried out in a reformer type furnace. In this type equipment, which is currently employed in the manufacture of hydrogen from natural gas, high alloy tubes are suspended vertically in a fired furnace, and the reacting gases pass downward through beds of catalyst contained in the tubes. The other process is as shown by equation $8CH_4 + 4O_2 = 8CO + 16H_2$. Methane combines with oxygen under pressure and temperature to produce carbon monoxide and hydrogen. This reaction gives off heat which may advantageously be used in other parts of the process. The partial combustion reaction (using oxygen instead of steam) has not been applied commercially at the present time, but for reasons which will be explained later appears to be more desirable for application in the synthetic gasoline development than the more fully developed reforming process.

The second step in the American synthetic gasoline development is substantially the same as in the German development; namely, the conversion of mixtures of carbon monoxide and hydrogen to hydrocarbons. Again, tremendous improvements in technology have resulted in greatly increased efficiency and reduced investment cost over the German commercial application. Improvement in the performance of iron catalyst has resulted in the development of a material, considerably cheaper than the German cobalt catalyst, which produces more gasoline of a higher quality over its useful life. Also, the material simultaneously produces quantities of valuable chemicals.

Investment and manpower requirements for the synthesis reaction have been greatly reduced by the application of the fluidized technique wherein a bed of finely divided solid catalyst is maintained in a turbulent state. The name "fluidized" is employed because the bed of dusty solids behaves like a fluid. This technique has already been applied extensively in the catalytic cracking art, where it is known as the fluid catalytic cracking process. The design of a synthesis gas reactor presents primarily a problem in close temperature control as well as provision for removal of large quantities of heat per unit volume of catalyst. The fluidized technique, wherein the rapidly circulating catalyst particles permit the transfer of enormous quantities of heat to adjoining cooling surfaces with a small temperature variation throughout the bed, is admirably suited to this reaction.

The accompanying diagram shows the principle of one scheme which is being studied for the manufacture of synthetic gasoline. Natural gas under pressure and oxygen are preheated and enter a combustion chamber wherein conversion of the reacting gases to hydrogen and carbon monoxide takes place at approximately 300 lbs. pressure and 2500°F. These gases are cooled with the evolution of useful heat and enter the synthesis reactor which operates at approximately 600° and 250 lbs./sq. in. pressure. The reaction products are cooled, and recovery of liquefiable hydrocarbons is carried out at approximately 200 lbs. pressure by conventional oil absorption techniques. The recovery step does not differ greatly from the recovery of natural gasoline from gas, and the techniques employed are similar. Light

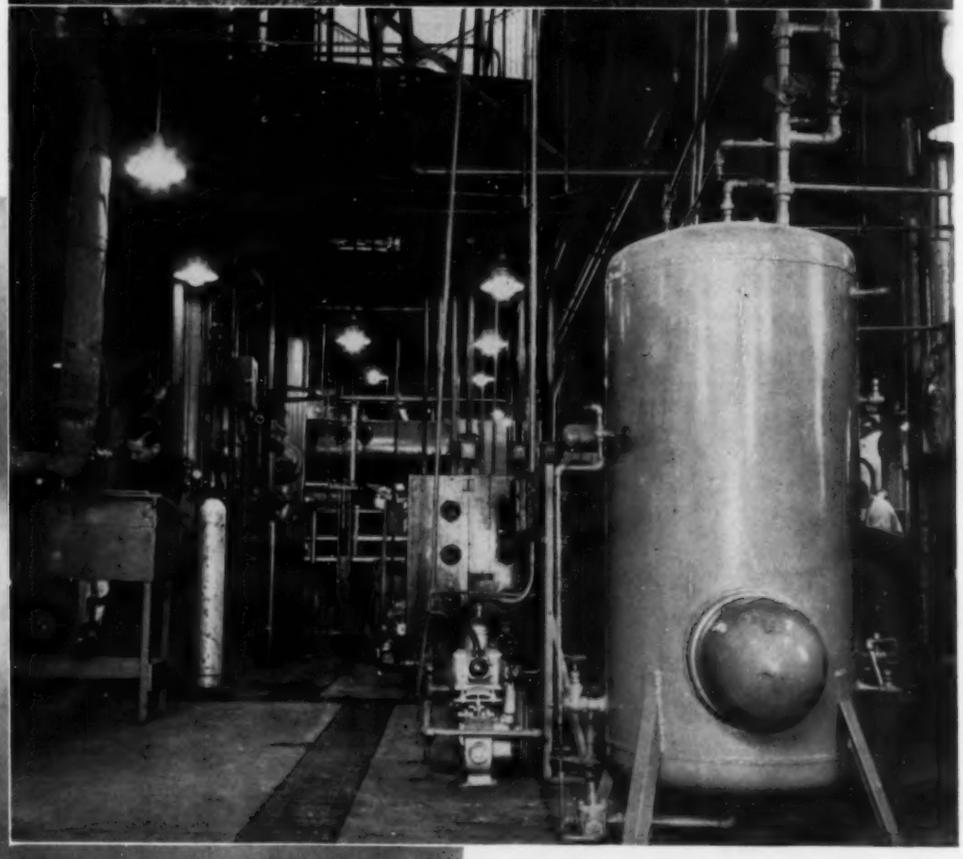


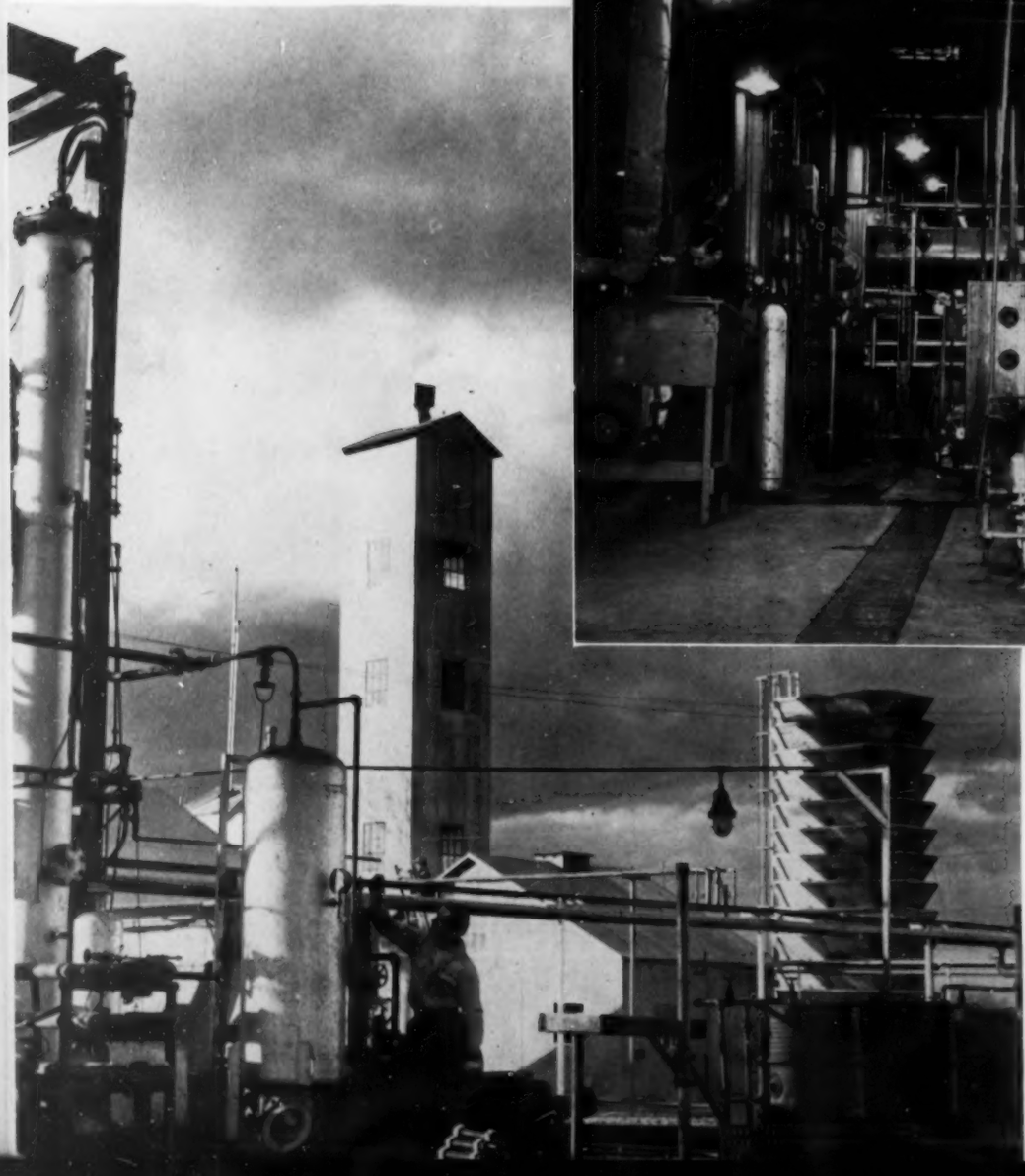
olefins produced in the process are polymerized to make high octane gasoline. The efficiency of utilization of carbon from natural gas is considerably greater than that for the utilization of coal in the German technique: 10,000 cu. ft. of natural gas containing approximately 340 lbs. of carbon is converted to one barrel of synthetic oil containing approximately 230 lbs. of carbon.

The partial combustion process has been shown in preference to the reforming process for synthesis gas manufacture. The partial combustion process with oxygen is more economical since it supplies large quantities of by-product heat and since it can be carried out at the pressure required for the synthesis and the pressure at which natural gas is usually available.

Unique Engineering Problems

Consideration of the several steps involved in the synthetic gasoline process shows that there are a number of unique engineering problems. In the preparation of synthesis gas by partial combustion, large volumes of oxygen will be required, and this material is to be prepared by a modification of the Linde-Frankl technique of low temperature distillation. While this process has been employed for some time on a small scale for the manufacture of oxygen, consideration is being given in the contemplated installation,





Above: Control house and combustion chamber where synthesis gas is prepared at Stanolind research laboratories.

Center: General interior view of reactor building.

Left: General view of Stanolind's pilot Synthol plant at Tulsa. Combustion chamber is at left, fluid reactor is housed in tall central building.

which is many times larger than any existing oxygen unit, to the possible improvement of the economics of the operation through the use of centrifugal air compressors, centrifugal expanders, reversing heat exchangers and other modifications.

The air compressors consist of two parallel units. Each unit is made up of two compressors with their individual drivers operating in series. Considerations of operating flexibility indicated that separate drivers are more desirable. Each unit consists of one compressor handling 93,000 SCFM from 13.2 psia to 40.5 psia and requiring 12,750 hp, and the second stage compressor handling 93,000 SCFM from 39 psia to 102 psia and requiring 8300 hp. The operating speeds for the respective units are 2800 RPM and 3000 RPM. The steam conditions for all turbines for the air compressors are 600 psi. 750°, at the throttle and exhausting to 3" Hg absolute. We believe that this installation totaling 42,100 hp will be the largest domestic installation of centrifugal compressors for compressing air to the final pressure mentioned above.

The oxygen compressors are unusual in that this is probably the first application in this country of centrifugal compressors for compressing oxygen from 15.5 psia to 310 psia. The quantity of oxygen handled by each of the two units is 17,700 SCFM. Each of these units consists of three compressors operating in series. The first two hp and the last stage of compression is handled machines are driven by a common turbine of 4760 by a separate compressor and driver of 1720 hp. Steam conditions for these turbines are 600 psi, 750°F at the throttle and exhausting at 185 psi and about 500°F.

The air expanders, used to provide refrigeration, will operate at a speed of approximately 9,000 RPM, inlet pressure about 91 psia, outlet pressure 21 psia with inlet and outlet temperatures of —233°F and —305°F respectively. Units of the size required for the job have never been previously employed.

The use of aluminum as one of the materials of construction for the process equipment in the oxygen plant presents some unusual fabricating problems. These are mainly problems that arise in the welding of aluminum plate in thicknesses greater than 1". A large part of the process equipment for the oxygen plant will be fabricated from 18-8 stainless steel.

The next step in the process, involving the partial combustion of the natural gas with oxygen, introduces some complex engineering problems. In this step, as previously pointed out, preheated methane and oxygen are mixed and react under pressures of about 300 lbs./sq. in. and 2500°F. temperature. The selection of suitable refractory materials to withstand the extremely high temperatures in the prevailing atmosphere, the design of suitable mixing equipment for the methane and oxygen, and the provision of adequate protection against excessive temperatures in the vessel walls constitute some of the problems.

Present plans for the synthesis gas generators are that a boiler will be used as a means of cooling the synthesis gas. We believe that this will be the first application of a pressure fired boiler operating at these conditions. The unit is being designed so that the heat transfer surface is removable for maintenance. The steam generating pressure will be approximately 650 lbs./sq. in. Water cooled walls will be provided to maintain a safe metal temperature on the shell of the vessel.

As an indication of the improved technology over the German method of synthesis gas manufacture wherein one water gas set had gas generation capacity equivalent to a daily production of 115 barrels of synthetic oil, in the proposed equipment synthesis gas equivalent to 3000 B/D of oil is produced in one vessel of 2000 cu. ft. volume, which also contains cooling surface sufficient to remove waste heat. Thus, only two such vessels are expected to be required for a commercial synthetic gasoline plant of 6000 B/SD capacity.

The design of the synthesis converters also introduces a number of interesting engineering problems. These include the provision of adequate cooling surface within the reaction vessel without interference in the necessary turbulence of the fluidized catalyst particles, a selection of materials of construction to withstand the abrasive action of the catalyst at the prevailing conditions of pressure and temperature, and the design of suitable equipment for the separation of suspended catalyst particles from the product gases leaving the reactor. In one design it is contemplated that a vessel of approximately 3400 cu. ft. volume will have a capacity for production of 1000 daily barrels of synthetic oil. This may be compared with the standard German reactor design in which 18 daily barrels of synthetic oil were produced in a reactor of 950 cu. ft. volume. Thus, in a commercial plant six reactors would be required to produce 6000 B/D of oil, whereas by the German technique some 300 reactor units would be required. Approximately 350,000 lbs./hr. of 650 lbs. steam would be generated in the synthesis reactors.

Approximately one billion cubic feet per day of gas are handled through the reactor section of a 6000 B/D plant. Recycle compressors handle about 750 MM cubic feet per day of this quantity. These are of the centrifugal type operating at 250 lbs./sq. in. suction pressure with a differential pressure of about 30 lbs./sq. in. Large quantities of heat (340 MM BTU's Hr.) are transferred by gas to gas exchangers requiring a large amount of surface.

The fractionating and recovery equipment for the recovery and finishing of hydrocarbons and chemicals is largely conventional. The equipment for the catalytic polymerization unit does not present any particular problems that have not been previously solved.

The utility section of the synthetic gasoline plant is unusual only in size. The entire plant requires about 1,200,000 lbs./hr. of steam at 600 lbs./sq. in. and 750°F for normal operation. About two-thirds of this requirement can come from the process units mentioned above. Fired superheaters superheat the steam from the process generators. The cooling tower is also somewhat unusual because of its size; present designs require a water circulating capacity of 135,000 GPM with a 14°F approach.

It is apparent that merely through the utilization of a more economic raw material but predominantly through the application of improved engineering and technology the American synthetic gasoline process is much improved in efficiency and economics over the German technique. In the present application, premium synthetic gasoline of approximately 80 octane number may be produced in competition with natural petroleum products of equivalent quality, taking into consideration operating and amortization costs, with natural gas at prevailing prices. It is currently indicated that the investment for a synthetic oil plant is of the order of $3000-$3500 per daily barrel of hydrocarbon product, which is less than half the corresponding figure for the German synthetic oil plants.

At the present time plans are being considered for the installation of at least two synthetic oil plants in the United States. One is to be built by Carthage Hydrocol, Inc., at Brownsville, Texas. The other plant is one being contemplated by Stanolind Oil and Gas Company, probably to be located in the Hugoton gas field in Kansas. In addition major facilities at both locations are planned for the recovery and purification of by-product chemicals.

A brief consideration is pertinent on the possible future applications of the synthetic gasoline process. It has been estimated by some of the more optimistic that within the next fifteen to twenty years the daily production in the United States of synthetic hydrocarbons might be considerably over 200,000 B/D. While interest at the present time is being devoted to the utilization of natural gas as a raw material, it must be recognized that the utilization of coal for this purpose in a variation of the present technique will become economically attractive as supplies of natural gas and petroleum products are depleted. Preliminary attention is already being devoted to the improvement of the engineering and technology involved in the mining and utilization of coal for this process, and further work will be done when economic conditions dictate. It may safely be predicted that adequate supplies of liquid fuels will be available for at least the next 1000 years at reasonable cost through the synthesis of these materials from natural gas or coal.

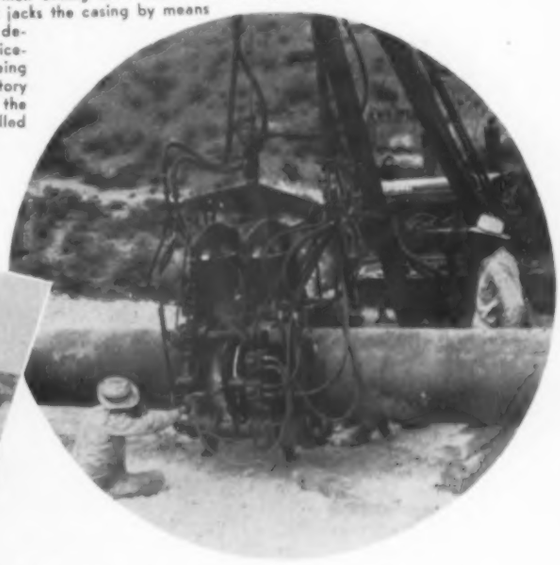
BUILDING THE BIGGEST INCH

Pipe was wrapped adjacent to the mill in Los Angeles and trucked direct to the field. Special care was used to prevent damage to wrapping en route and during unloading.

In the desert west of Blythe, Calif., right of way was leveled so that pipe could be hauled in but wind often covered the pipe before the ditchers arrived.

Left—Preparing right of way east of Jack Rabbit pass west of Beaumont, Calif. Below: Two views of ditching operations. Buckeye ditcher with Caterpillar diesel power here was digging a 48-inch trench six feet deep at 18 feet per minute.

Left: Installing a 36-inch casing underneath a state highway. The machine bores inside of the casing, then jacks the casing by means of a hydraulic jack. Above: Portable electric sander designed by Price cleans pipe ends for welding. Right: Price-Elliott internal line-up clamp on which patents are being sought. Clamp is inserted in the 30-inch pipe preparatory to aligning another section. Expanding clamps hold the sections in place internally. The device then is propelled under its own power to the next joint.

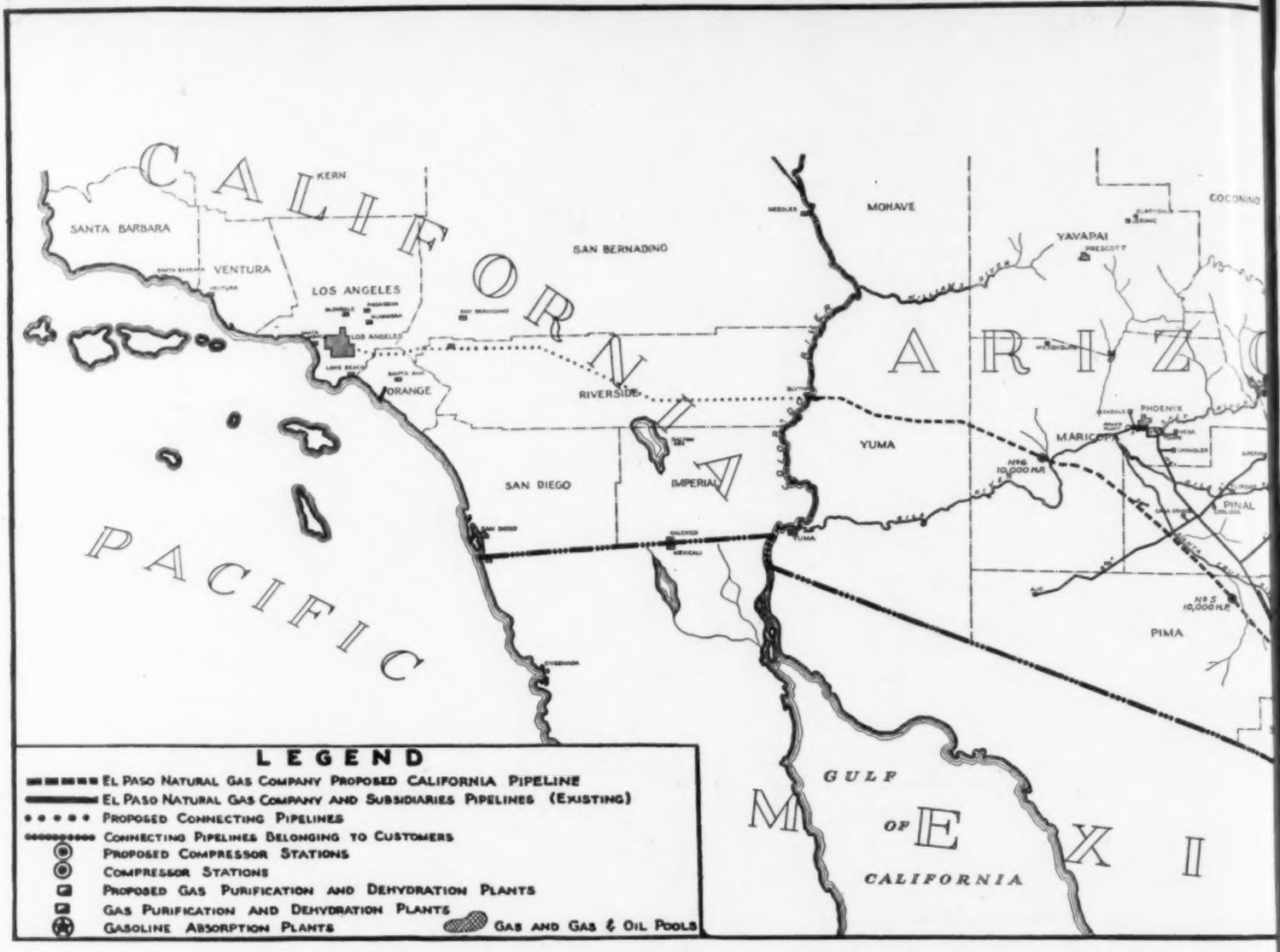


Pressure welding clamp used on El Paso Natural section of the line.

Left: Insulating welded joints before lowering pipe.

A large number of side-boom tractors were necessary to lower the line into the ditch. Line weighs 7,000 pounds per 60-foot section.

Backfilling with a Cardwell dragline. This was a double operation, first filling the ditch and secondly heaping to allow for settling. Speed was 3,000 feet per hour on each operation.



Biggest of all the "inches", a huge steel cylinder that will join the gas fields of the Lone Star State to the teeming industrial area of Southern California, is being pushed across the southwestern sector of the United States. Half a dozen crews of skilled pipeliners, each with its train of "cats" and trucks and all the mechanical appliances of modern line construction, are at work on different sections of the great duct. When completed, it will traverse a distance of just over 1,200 miles, from Dumas, Texas, to Santa Fe Springs in the environs of Los Angeles.

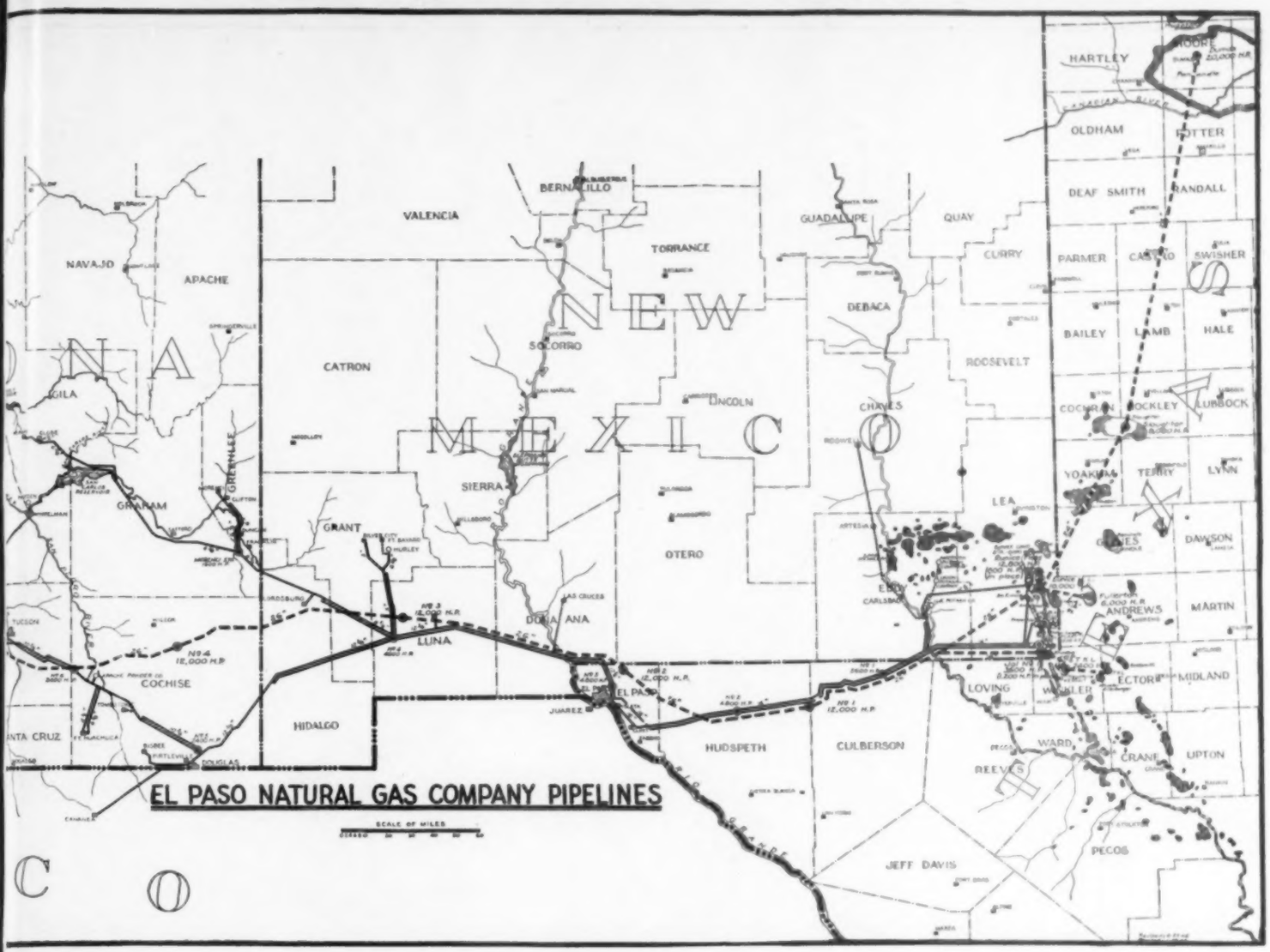
The line gets its nickname, the "Biggest Inch", to which it is fully entitled, from the fact that its western portion is 30 inches in diameter, the largest ever employed for such a purpose. This section extends from the eastern border of California at Blythe to the terminal at Los Angeles. It is being built by the Southern California Gas Company and the Southern Counties Gas Company. The central section is of 26 inch diameter and connects Eunice, New Mexico, with Blythe. The eastern portion runs from Dumas, Texas, to Eunice. It is 251 miles in length with 24-inch pipe. All the pipe east of California is being laid by El Paso Natural Gas Company.

Only a few years ago Californians would have scorned the suggestion of bringing gas into their state from outside, but the phenomenal growth of population and industry in the southern end of the state, together with the decline in available fuel supply, has brought about a condition in which the state's production is inadequate for the needs of 3,500,000 people. The shortage in local supply estimated at some 500,000,000 to 600,000,000 cubic feet for the current year is certain to become progressively more acute. It is to remedy this situation that $70,000,000 is being expended on the new line which is to deliver 125,000,000 cubic feet daily for the first year, 175,000,000 cubic feet for the next three years and 305,000,000 cubic feet per day from that time on. The supply of gas is assured by long-term contracts with Phillips Petroleum Company, Shell Oil Company and Warren Petroleum Corporation and other companies will come from the holdings of these companies in the Panhandle, Permian Basin and Hugoton fields.

A question often asked by those unfamiliar with the industry is why the western section of the line is of larger size than other portions of the system. The explanation is that the greater capacity furnishes a means of taking care of sudden fluctuations and sharp increases in consumption that are bound to take place from time to time. Providing this storage requirement within the line itself is both more effective and more economical than depending on outside storage.

The California portion of the line is being built by the H. C. Price Company, constructors of many of the country's large lines, and the 30-inch pipe used on this portion of the system is being produced by Consolidated Steel Corporation using the continuous weld process. Steel plates 30 feet long and 92 inches wide and from 9/32" to ½" thick are fed into forming machines which press them into cylinders, weld the edges and stretch the pipe to the exact dimension required. The welding lengthwise of the edges of the steel after it is pressed into shape is accomplished in a machine in which a heavy current passes between the plates and an electrode, fusing the metal and joining the edges in a union stronger than the plate itself. Two 30-foot sections are welded into a 60-foot length, the welds are x-rayed and the pipe is then ready for shipment to the field.

The pipeliners' task of preparing the trench and placing the pipe in position offers some unusual problems because of the size of the pipe and the nature of the terrain along its route. Much of its course runs across the sandy wastes of New



Mexico and Arizona, while the western section traverses the badlands of California where there are neither permanent residents, housing accomodations nor water, where trailers serve as district offices and pipeline crews have to carry their own commissary as well as equipment for excavating the line and laying the pipe. Overcoming physical difficulties, however, is part of the pipeliner's routine.

Some innovations in pipe laying technique have been introduced in the construction of the Biggest Inch. Because of the size of the pipe, the trench in which it rests is of more than usual size, being five feet deep and three and a third feet in width. Extra large and heavy machines are employed for trenching, and it is stated that the assemblage of bulldozers and other earth-moving equipment and of machine for handling and treating pipe is the greatest ever brought together for this purpose.

A portable electric sander, designed by the research department of the H. C. Price Company, is used for the rapid cleaning of pipe ends, preparatory to welding. A Price-Elliott internal line-up clamp is employed for the exact alignment of pipe sections. This clamp is of a new type which is self-propelled and self-expanded by electric motors. Five tractors equipped with booms are used in lowering into the trench the long sections of pipe after welding and coating. Each of these sections weighs approximately 30 tons, and the pipe is slung on heavily padded belts to prevent damage in lowering-in.

Another departure from past methods of testing field welds is the use of a portable laboratory for x-raying these connections by the Gamma-ray method. The welds are photographed immediately upon completion, the films are developed in the laboratory and the results reported to the welding foreman, thus avoiding delays in filling-in operations.

Fields tapped by the new California line contain more than a third of the known natural gas reserves of the United States. Testifying at a recent natural gas act hearing, John H. Murrell of the firm of DeGolyer and MacNaughton of Dallas showed that West Texas and Panhandle gas fields contain 31,020 billion cubic feet of recoverable gas. To this must be added most of the 14,010 billion cubic feet of recoverable gas in Kansas fields, since the Hugoton field is actually a part of the region tapped by the new line, and a considerable part of Oklahoma's 7,850 billion cubic foot reserve, much of which will be produced from the Oklahoma Panhandle.

For the entire United States Mr. Murrell estimated a reserve of 151,260 billion cubic feet at 16.4 psi pressure and 60°F. The West Texas and Panhandle of Texas reserves are 20 percent of known U.S. reserves, and adding Oklahoma and Kansas the percentage rises to 35.

Much of the gas adjacent to the new line is sour. Hydrogen sulfide content rises in some areas to 4,000 grains per hundred cubic feet, and 1,000 grains is common. Some gases also contain considerable quantities of CO_2 so that Btu. values are too low for commercial gas.

A few years ago the Permian Basin gas reserves were held in small esteem because of the high sulfur content as well as inaccessibility to markets. But treating processes now have been developed to the point where H_2S and CO_2 can be removed efficiently and cheaply. Highly sour gases are being brought down to ¼ grain of H_2S per hundred cubic feet, and often the content can be brought down as low as 1/10 grain. Early processes in which gases were scrubbed with soda solutions have been supplanted with organic chemical processes using monoethanolamine or diethanolamine followed by dehydration with

ethylene glycol. Diethanolamine is capable of absorbing 140 times its own volume of CO_2 and up to 200 times its own volume of H_2S.

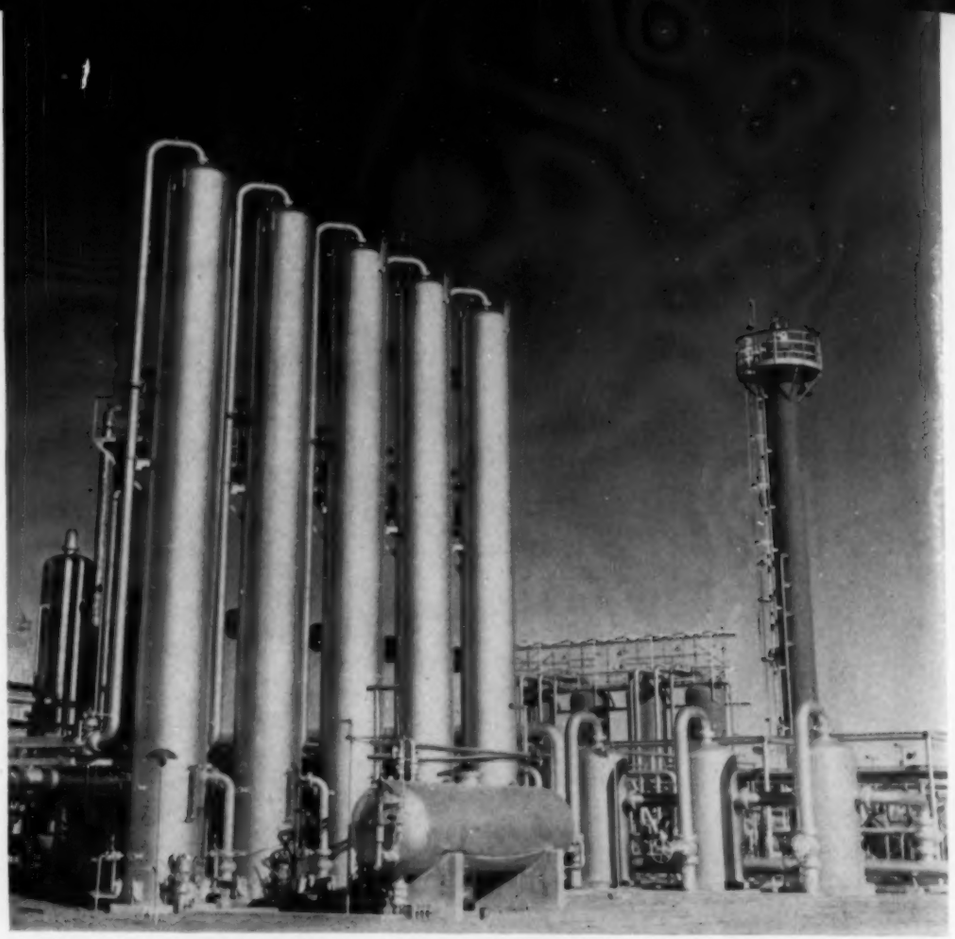
Modern processes are so well developed that the mono- or di-ethanolamine is regenerated without excessive loss and continuously recycled. The same is true of the glycol used for dehydration. So simple is the process and so compact that in some instances individual units are placed on single gas wells.

Gas reserves now constitute an important part of the assets of a good many oil companies. Phillips Petroleum Co. is a prime example. Phillips now has leases on more than a million acres of proven gas lands and holds contracts for the purchase of gas from an additional 500,000 acres.

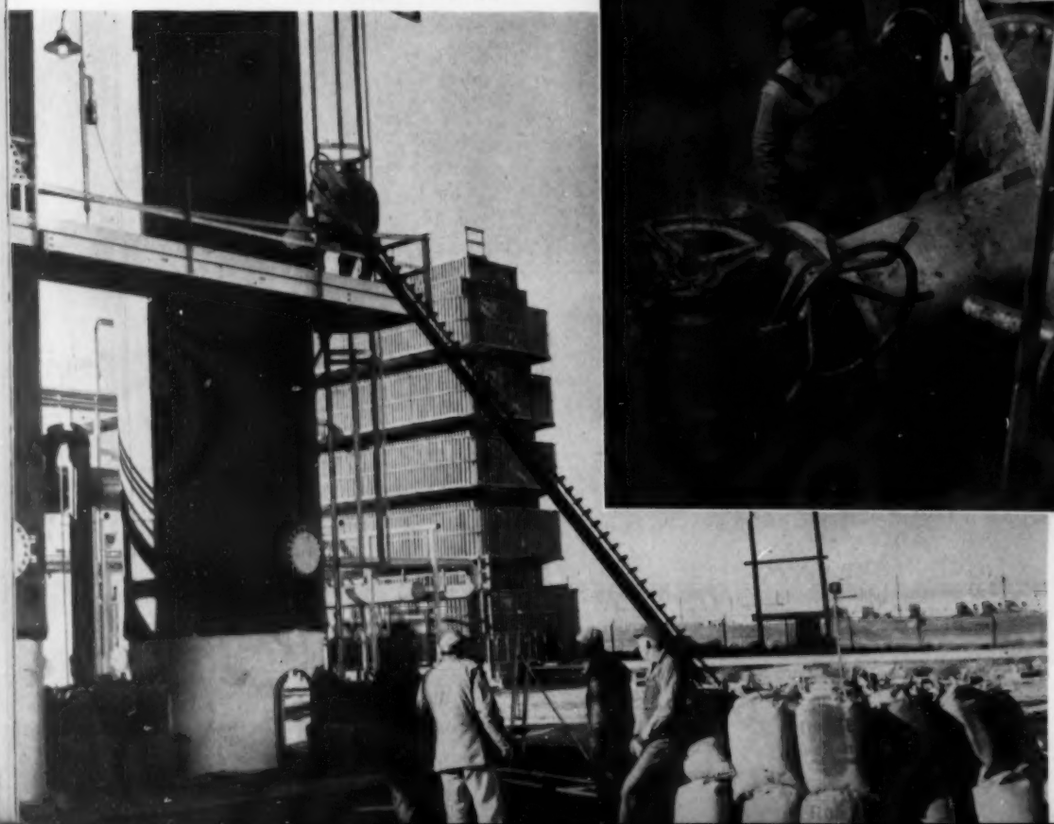
At the end of 1946 Phillips was selling gas at the rate of 360 billion cubic feet per year with a gross sales value of $12 million. Recent sales such as those to El Paso Natural and Panhandle Eastern will increase Phillips' deliveries to 535 billion cubic feet when pipe line facilities are available.

In its annual report for 1946 Phillips stated that its gas reserves were equal to nearly three billion barrels of oil in terms of energy content. Assuming that the energy of a barrel of crude oil is about equal to that in 5,500 cubic feet of gas, it may be calculated that Phillips gas reserves are on the order of 16 trillion cubic feet. This is roughly 10 percent of the proven reserves of gas in the United States as estimated by DeGolyer and MacNaughton.

Note: Photographs with this article were supplied by the H. C. Price Co., El Paso Natural Gas Co., Phillips Petroleum Co. and Caterpillar Tractor Co.



Solid type dehydrators at Phillips Petroleum Company's Hansford gasoline plant used to prepare dry gas for pipeline delivery.



Valve assembly in gas gathering system. ↑

Filling dehydrator chambers with dessicant in gas treating plant at Phillips gasoline plant. ←

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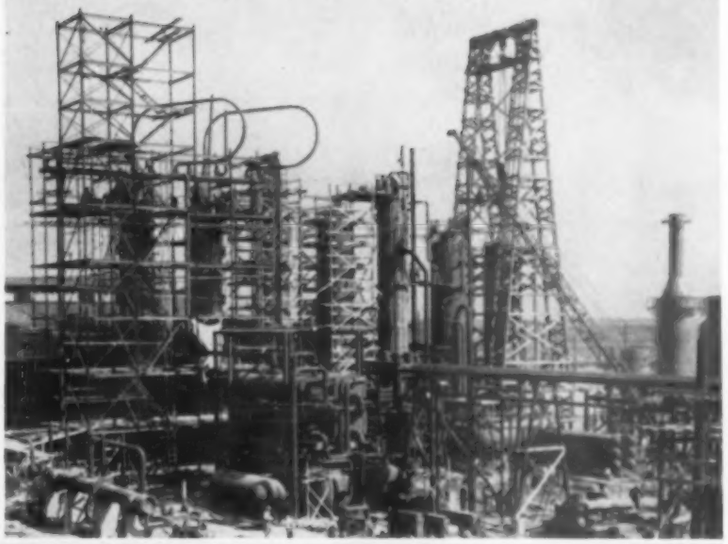
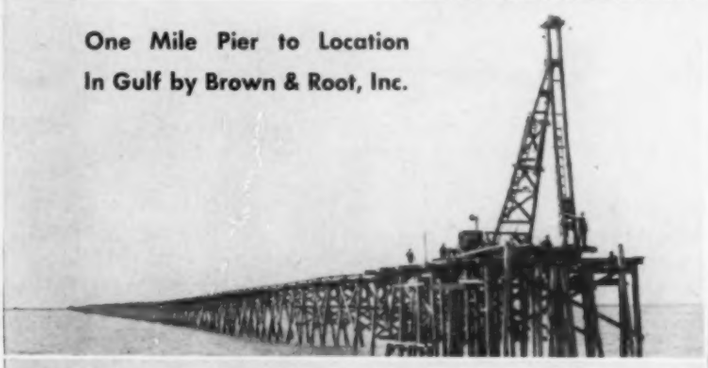
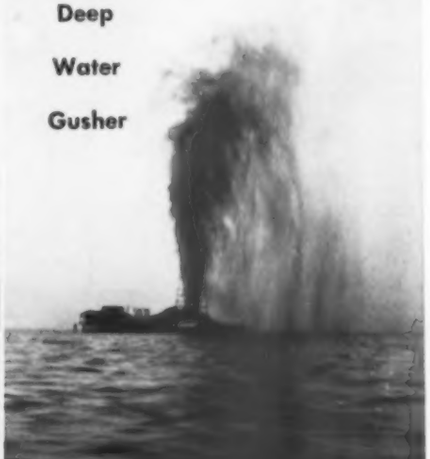
Unit of Chemical Plant at Dumas, Texas
Erected for Chemical Construction Co.
By Brown & Root, Inc.



One Mile Pier to Location In Gulf by Brown & Root, Inc.



Deep Water Gusher



Oil Well Foundation in Gulf of Mexico

BROWN & ROOT, Inc.

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ITALY A PROMISING OIL MARKET

Enforced Transition from Coal to Oil and Gas Stimulates Company Plans for Expanding Facilities

MORE than at any previous time oil is recognized today as the dominating factor in the reconstitution of Italy's industrial economy. Before the war chief dependence was placed on coal and hydroelectric power. The continuing shortage of the latter and the demonstration during the past two years of the unreliability of coal supplies, even at the exorbitant prices that have prevailed, have shown that oil and gas are more dependable and better suited to the country's needs. Motor cars and trucks are capable of supplying to a great extent the service formerly rendered by the railways which is far from being restored. Diesel plants are being installed in increasing numbers to provide electric service and industrial power. Butane and propane, though not now available in quantity, are ideally suited to Italian requirements for heating purposes.

Two important considerations are brought to the forefront by this situation. One is that Italy is certain to become a much larger market than heretofore for petroleum products. The second, and this is of special consequence to the country itself, is that means must be found of assuring an adequate supply of oil products and one that will not be subject to interruption, at least so far as this is possible. This combination of circumstances has given rise to numerous reports of new activities and new combinations of interests, some of which appear to have good foundation.

The output of Italian refineries for the first quarter of 1947 was roundly 110,000 metric tons. This rate will be increased during the year as more plants get into operation but will still fall far below the country's requirements, which are estimated at roundly 2,750,000 tons. To meet this situation and to provide minimum stocks for operating purpose, the program laid down for the year contemplates imports of 3,200,000 tons. The estimates for various products are based largely on statistics for the last prewar year with moderate increases in the case of motor fuel, kerosene and lubricants. The outstanding change applies to fuel oil, for which an increase from 1,000,000 to 1,700,000 tons is calculated.

To what extent it will be possible to carry out this program will depend upon the progress made in restoring the industrial facilities of the country. Two years after termination of the war, these are still lagging far below the level which they had been expected to attain. This is due in large part to the delay in completing the peace treaty and to uncertainty in regard to deliveries of petroleum supplies and materials of construction. At the beginning of the year only 15 percent of the country's service stations were in operation, and only a slightly larger proportion of normal storage capacity was available for use.

The international companies that were the principal suppliers of petroleum products in the prewar period are keenly interested in re-establishment of the Italian market on a stable basis. In this connection much interest attaches to reported arrangements between some of these large distributors and domestic organizations. One of these reported understandings is indicated by the organization at Rome of the Industria Raffinerie Olii Minerali per L'Industria del Petrolio in Italia, with an initial capital of a million lire of which 51 percent has been subscribed by the AGIP (Azienda Generale Italiana Petroli) and 49 percent by the Anglo-Iranian Petroleum Company. It is understood that an increase of such capital to 600 million lire is contemplated through assignment to the company of the Porto Marghera (Venice) refinery of AGIP and of the delivery of crude oil worth 2,000,000 pounds by the Anglo-Iranian Petroleum Company to be transformed into refined products and to be sold on the Italian market through the distribution organization of the Azienda Generale Italiana Petroli. The agreement between the AGIP and the Anglo-Iranian is said also to provide for an enlargement of the Porto Marghera crude oil working capacity to 400,000 tons yearly by the addition of both distillation and cracking units, and by the construction of new storage facilities in the Venetian lagoon. In order to facilitate the distribution of the refined products in the main North Italian centers, it is expected that a transport company will be organized to operate tanker barges on the River Po.

Under this proposed consolidation, it appears the AGIP will cease to be a refining organization and will devote itself to marketing activities, although no information has been made public as to its course with regard to its projected refining facilities in Genoa, Naples and Sicily. At the same time it is reported that an arrangement is contemplated by which Standard Oil Co. (N.J.) through its subsidiary, Societa Italo-Americana del Petrolio (SIAP) will market the refined products of the Bari and Leghorn refineries of the Italian company.

A third possible phase of the competition between the various international oil organizations for the Italian market is the reported negotiations which for some months have been rumored of a combination between the joint interests of The Texas Company and Standard Oil Company of California, represented by California-Texas Oil Company, and Italian industrial groups looking to the construction of a refinery in Genoa which would produce fuel oil and diesel oils for Italian power and traction concerns in Turin and Milan. Demands for these products is growing rapidly owing to the conversion from coal to oil both in industry and in traction. In this connection it is interesting to note that the Italian State Railway Administration has ordered the Societa Italiana Ernesto Breda of Milano to re-engine 200 diesel railcars which were damaged by the German forces during the war and to study a new type of diesel railcar fitted with a 460 HP engine consisting of twelve cylinders working horizontally instead of vertically. Fiat in Turin has also under construction diesel-engined trains. A 200,000 KW steam center is to be built in the Milan district and is to be provided with oil-burning boilers, while all the merchant tonnage under construction at present in Italy is to be fitted with diesel machinery.

It is of particular interest to the Italian government to re-establish the tourist trade which in past years was a substantial factor in providing

(Continued on page 66)

Western's activities since the inception of the company in 1933 include operations in every major producing and potential petroleum producing province in the United States. This wide experience, solving all types of geophysical problems, together with superior personnel, equipment and research facilities enables *Western* to meet every requirement of operators desiring the most complete and highly advanced geophysical service.

The accuracy of its surveys is attested by its numerous clients and by the many discovery wells which have been located on the basis of Western surveys.

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SOCONY-VACUUM REORGANIZES FOREIGN TRADE DEPARTMENT

SOCONY-VACUUM Oil Company, Inc., has realigned its foreign trade department, headed by Walter L. Faust, vice president and director of the company. The department is now composed of two groups: planning staff and operating line. Essentially the staff plans and formulates policies, while the line approves policies, puts them into effect and observes their results.

The operating line is headed by Francis E. Powell, Jr., chairman of the foreign trade committee, who, in addition to supervising all direct business, has the added responsibility of handling industrial relations and organization of various affiliates and branches. F. E. Wilder is industrial relations advisor. Mr. Powell also heads operating activities for Great Britain. F. H. Henry is vice chairman of the foreign trade committee and is in charge of Middle East operations.

Arthur G. Reed heads marketing operations in France, Belgium, Holland, Switzerland, North Africa, Spain and Italy; R. S. Homet is in charge of Portugal, West Africa, Spanish Morocco, Canary Islands and Gibraltar; L. A. Blumenthal heads operations in South America, Central America and Mexico, as well as being temporarily in charge of Norway, Sweden, Denmark, Finland, Iceland and Germany; and L. R. Owen has taken up his new duties in connection with marketing in Turkey, Greece, Bulgaria, Yugoslavia and Romania. Paul Lineau temporarily is in charge of Czechoslovakia, Austria, Hungary and Poland. O. J. Bellis heads staff departments at 26 Broadway, coordinated sales programs, lubes and special products.

Composing the planning staff are C. V. Barry, European representative; C. F. Darlington, American representative; C. T. Crawford, manager of the supply department and Mr. Blumenthal and M. J. A. Bertin, assistant general managers of the foreign trade department. Mr. Crawford has charge of purchases, exchanges, supply and coordination, and crude and bulk sales. Under the new alignment, H. F. Tarbox is general assistant to Mr. Faust, and A. D. Stewart is foreign trade economist.

Francis E. Powell Jr. has been general manager of the marine sales department of Socony-Vacuum Oil Company, Inc., for the past nine years and for part of that time he has also served as general manager of the aviation sales department. Before joining Socony-Vacuum in the New York office, Mr. Powell was with Standard Oil Company of New Jersey from 1924 to 1933, when he was made a director of Vacuum Oil, Ltd., London.

F. H. Henry became associated with Socony-Vacuum in 1919. He served as assistant to the company's general manager in Cairo, Egypt, and next became manager in Syria. After several years as general manager for the Near East division with headquarters in Cairo, he came to New York in 1930 as a member of the refined oil committee and executive in charge of the Near East division.

Leslie A. Blumenthal has been a foreign marketing executive of Socony-Vacuum since he joined the company in 1931. Prior to that he was engaged in sales management activities.

Coastal Land Case Decision

On June 23 the U. S. Supreme Court ruled in a six to two decision that the federal government has title to submerged oil lands beyond low tide off the coast of California. The state had claimed title to these lands and had granted about 100 leases to oil operators.

While the case was restricted to the California coastal lands, it brings into question the leases which have been granted by Gulf coastal states to a number of companies. Louisiana and Texas both have granted large leases on submerged lands of the continental shelf. Magnolia Petroleum Co. recently completed as a dry hole a well five miles from the nearest land and has been preparing to drill another wildcat 29 miles from shore. Louisiana claims title to the Gulf for 27 nautical miles from low tide.

Two dissents from the majority decision were filed. Justice Reed stated that California was admitted on the same footing as the original 13 states which he said owned the ocean floor for a distance of three miles. Justice Frankfurter said he thought the matter was political and should be decided by Congress rather than the Supreme Court.

Reimpose Export Controls

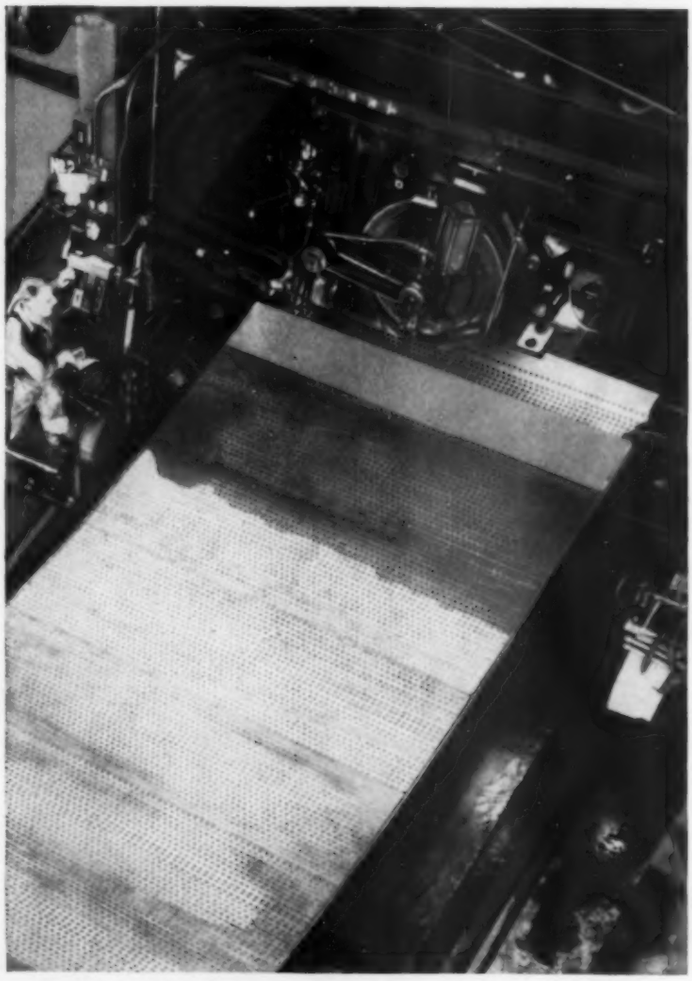
News that oil was being exported from the West Coast to Soviet Russia created enough Congressional criticism to cause the Department of Commerce to reimpose wartime controls on exports of petroleum products. The controls became effective on June 30, just ahead of the date on which the law authorizing such controls expired. It is assumed that extension of the law will be forthcoming in view of the recent criticism.

Some of the members of the foreign trade committee of Socony-Vacuum Oil Company, Inc., holding first meeting following re-assignment of duties. Left to right: R. S. Homet, O. J. Bellis, Walter L. Faust, vice president and director in charge of foreign trade; Francis E. Powell, Jr., chairman of the foreign trade committee; F. H. Henry, vice-chairman of the foreign trade committee and L. R. Owen.

Planning staff of foreign trade committee, Socony Vacuum Oil Company, Inc. Left to right: C. V. Barry, L. A. Blumenthal, C. T. Crawford, C. F. Darlington, Walter L. Faust, vice president and director in charge of foreign trade; H. F. Tarbox, general assistant; Francis E. Powell, Jr., chairman of the foreign trade committee, and M. J. A. Bertin.

SMITHway PRESSURE VESSELS

Corrosion-resistant Smithlining can now be done with 21 different alloys



A. O. Smith-built resistance spot-welding machine welding sheets of alloy steel to steel base plate.

When corrosion resistance first became important to the petroleum industry, A. O. Smith inaugurated a research project to develop a relatively low-cost method of satisfactorily lining carbon-steel vessels with a corrosion-resistant alloy.

This project, No. 71,074, resulted in *Smithlining*, a patented process of resistance-welding sheets of alloy steel to a variety of steel base plates, and then forming into segments, cylinders, cones, or heads.

Project 71,074 has never been closed out.

To date it has made practical use of 21 different alloys as linings. It imposes no size limitations. It provides for uniform alloy thickness to normal sheet tolerances. It permits two-surface inspection of both lining and base plates, as well as chemical analysis and gauging of both.

It makes possible the successful application of lined vessels to an increasing variety of corrosive services in the petroleum industry.

A. O. Smith engineers are prepared to make a study of your vessel problems, for both corrosive and non-corrosive service. Your inquiry will be promptly answered.

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International News and Notes

Heads Shell's Egyptian Operations

R. G. Searight has been appointed general manager of the Shell Oil Co., of Egypt, Ltd., and of Anglo-Egyptian Oil Fields, Ltd. He succeeds D. R. Macintosh.

Mr. Searight joined the Shell group of companies in 1928 and first went to Egypt in 1931. In 1937 he was sent to the United States for two years and subsequently was stationed briefly in London and in Romania. He became assistant manager of operations in Egypt in 1945 after an absence from the company for nearly five years as a civilian oil adviser to the petroleum section of A.F.H.Q.

East Indies Companies Change Names

Standard-Vacuum Oil Company will change the names of its three operating affiliates in the East Indies as soon as approval is obtained from appropriate government authorities. President L. W. Elliott explained that "N. V. Standard-Vacuum Petroleum Maatschappij" will be the new name of the company's principal producing and refining subsidiary which heretofore has been known as N. V. Nederlandsche Koloniale Petroleum Maatchappij. This company has producing properties in the Indies and a large refinery near Palembang, Sumatra.

"N. V. Standard-Vacuum Tankvaart Maatschappij" will be the new name of N. V. Nederlandsche Koloniale Tankvaart Maatschappij, which operates a fleet of small tankers carrying oil products from the refinery to markets throughout the Indies and to Singapore, Malaya, Indo-China and Siam. The third company which is incorporated at Batavia, Java, and which carries on marketing operations in the Indies, will henceforth be known as "N. V. Standard-Vacuum Sales Company" instead of N. V. Koloniale Petroleum Verkoop Maatschappij."

Philippine Imports

Philippine imports of petroleum products, excluding those for military use, amounted to 1,752,202 barrels during 1946. They included 60,781 barrels of aviation fuel, 719,540 of motor gasoline, 409,356 of kerosene, 389,266 of diesel oil, 100,182 of other fuel oil, 59,689 of lubricating oil and 13,438 of grease. Imports of asphalt were 20,370 long tons. Of total receipts, 703,340 barrels came from the United States and the remainder chiefly from the Persian Gulf.

Yorkshire Exhibit

One of the outstanding exhibits at the recent British Industries Fair at Manchester was the stand of The Yorkshire Copper Works, Ltd., of Leeds, England, and Barrhead, Scotland. As a reminder of the wide range of products of the company, the exhibit showed seamless copper tubing from capillary threads to giants of 24-inch diameter. Special tubing of aluminum brass to resist corrosion and cupro-nickel were some of the added products displayed. The Yorkshire stand was designed by the company's engineers. Hidden within the structure was a private office were callers could discuss business in restful privacy.

Canada's New Field

Most promising recent oil development in Canada has been the discovery of the Leduc field south of Edmonton in Alberta province. The first well was brought in on February 13 of this year by Imperial Oil, Ltd., and maintained such a substantial flow that four additional wells were started. The second and third of the group came in during May, each with good production from 5,000-5,500 feet. With this demonstration the company feels assured that it has located a field of such size that it will do much to offset the lagging production of Turner Valley, and further development work is being pushed.

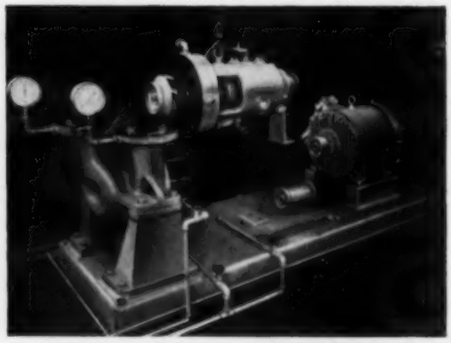
Norway's Imports Tripled

Revival of industrial activity in Norway is indicated by imports of petroleum products of 4,716,317 barrels during 1946, compared with 1,407,634 during the preceding year. Imports by products during 1946 were as follows, in barrels: gasoline, 1,848,402; kerosene, 173,358; white spirit, 74,908; diesel oil, 655,646; gas oil 1,177,229; other fuel oil, 599,566; other petroleum products, 187,208.

The leading countries of origin of imports into Norway, in barrels, were: Curacao, 1,998,669; Iran, 1,130,668; United States, 1,059,152; Venezuela, 261,113; and United Kingdom, 229,856.

Junta Takes Concession

Junta Petroleum Company of Colombia, an affiliate of The Texas Company, has signed a concession contract covering the Sahagun block near the Tablon district where Texas is now engaged in exploratory drilling and where Tablon No. 1. was recently completed as a gas well with an ontput of 18 million cubic feet of gas daily. The concession covers an area of 34,808 ha.



British Pump Exhibited

At the recent British Industries Fair an exhibit of centrifugal pumps for oil refineries and other chemical industries was shown in Sigmund Pumps, Ltd., of Gateshead-on-Tyne. The pumps are an entirely new approach to pump design by British manufacturers. Previously most centrifugals in Britain and in normal British trade territory were imported from the United States.

The new British pump features a novel casing design and a spacer-type coupling permitting the rotor to be dismantled for inspection without disturbing alignment of prime mover and pump casing.

Production in Iran

Crude oil output in Iran during the first two months of 1947 was 3,018,000 tons (21,126,000 barrels). Production in February was 1,378,000 tons or approximately 344,500 barrels daily.

Exhibits Petrochemicals

The Manchester Oil Refinery group of companies maintained exhibits at both Manchester and London sections of the British Industry Fair in May. At Birmingham the exhibit consisted of special oils and chemicals for industry and was sponsored by Manchester Oil Refinery, Ltd. At London, Petromor, Ltd., and Raven Oil Co., Ltd., associated companies, exhibited petroleum aromatic extracts for paint formulation, core oils, printing inks and sizing; petroleum sulfonates, fat splitting agents, detergents and wetting agents.

Venezuelan Production

Production of crude oil in Venezuela during the month of April amounted to 34,297,546 barrels, an average of 1,143,251 barrels daily. This daily average is 17,344 barrels less than during March. Exports for the month were 32,251,868 barrels. Production by companies was as follows:

Company	West	East	Total
Creole	12,695,176	4,540,481	17,235,657
MeneGrande	1,771,056	4,406,677	6,177,733
Shell	9,228,866	—	9,228,866
Consolidada	—	637,956	637,956
Socony	—	748,739	748,739
Texas	—	218,627	218,627
S.A. Pet. Las Merc.	—	6,988	6,988
B.C.O.	30,378	—	30,378
Orinoco	7,780	—	7,780
Phillips	—	2,497	2,497
Varco	—	2,325	2,325
Total Barrels:	23,733,256	10,564,290	34,297,546

Sells Kuwait Crude to Shell

Gulf Exploration Company has made a long-term sale of crude to the Shell Petroleum Co., Ltd. of London. Under the agreement Shell will purchase increasing annual quantities of crude to be produced from the Kuwait fields.

Two More Wells in Brazil

Drilling operations in Brazil resulted in the bringing in of two more wells in the Candeias field in December, 1946. These are designated as Candeias No. 27 and No. 37. During a 24-hour test run through a 30/64-inch choke, the former produced 944 barrels. No. 37 is described merely as a small producer.

British Oil Conversion

Oil consumption in Britain will be increased five million tons yearly by 1948, it was announced recently by Emanuel Shinwell, minister of fuel and power. This will reduce British coal consumption eight million tons. Additional conversion will be made next year to bring the total increase in oil consumption to six million tons per year and the coal saving to ten million tons.

The ministry has calculated that for every added million tons of oil imported as a coal substitute, it is necessary to provide 25,000 tons of steel for installations and transport plus 20,000 tons of recurrent steel per year for producing and refining operations.

Transjordan Concession

Petroleum Development Corp., subsidiary of Iraq Petroleum Co., has been granted a concession to explore and exploit all of Transjordan. The concession runs for 75 years and obligates Petroleum Development to perform certain geological and drilling operations.

The shape of things to come

The human capacity to create progress out of problems is the one common denominator in every forward step ever made in industrial science. And no one man has ever held all the answers.

Successful and productive creative engineering has always been the product of many minds and many talents, honed to razor sharpness by constant, challenging experience.

It is a unique pooling of brain-power, more than any other factor, that accounts for the important contributions to petroleum refining credited to Kellogg over the past 35 years.

Because of those facts, we place the greatest emphasis on our company's pool of "know how", for the better processes and better machines of tomorrow will logically come from the same source that created them in the past—specialized talents and high caliber minds coordinated and concentrated on the same problem.

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ENGINEERS TO THE PETROLEUM INDUSTRY

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OIL COMPANY STAFF CHANGES

George W. Ray, Jr.

GEORGE W. RAY, JR., has been appointed general counsel for the Arabian American Oil Company. He has been general attorney in the legal department of The Texas Company since January, 1942, and has been counsel for various Texaco departments for the past 25 years. Since 1933 he has been concerned principally with work as the company's representative in its contacts with various government agencies.

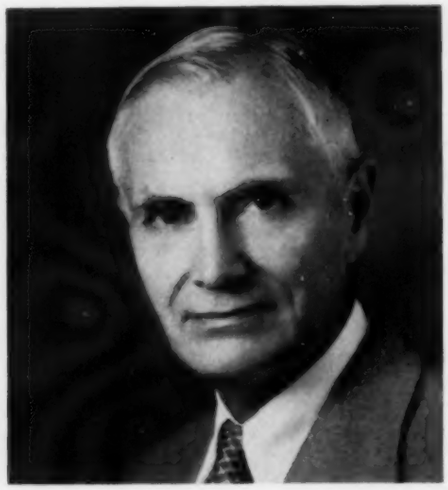
A native of Cripple Creek, Colorado, Ray attended grade and high schools in Fort Worth, Texas, and was graduated from the University of Texas. He joined The Texas Company in 1922 soon after his graduation from the Columbia University School of Law.

R. B. ROARK, vice president and area manager for the Shell Oil Company in Tulsa, Okla., retired July 1 due to persistent ill health. Mr. Roark began as an instrument man and served Shell for 29 years. He began his career with Shell in 1918 immediately upon leaving the University of Oklahoma. After a leave of absence during World War I, he returned to the company as an assistant geologist and thereafter progressed rapidly through various positions until 1937 when he was appointed vice president.

Mr. Roark is succeeded as area manager by W. A. Alexander who was graduated from Louisiana State University in 1928 with a BS and MS in geology. He joined Shell as a district field engineer and rose to area manager in Houston, Texas, which position he maintained until his present appointment.

W. L. INGRAHAM has been appointed to the newly-created position of assistant coordinator of personnel development for Standard Oil Co. of Calif. He will serve with J. E. Norton, coordinator of personnel development, and will assist in the selection, placement, training, appraisal and recognition of key personnel.

JOHN C. AGNEW has been elected assistant secretary and assistant treasurer of Sun Oil Company, John E. Rohrer will succeed Mr. Agnew as manager of the payroll department. Mr. Agnew will serve in his new office in addition to H. W. Unruh, who has been assistant secretary and assistant treasurer of the company since Feb. 6, 1931.



Dr. Frederic H. Lahee

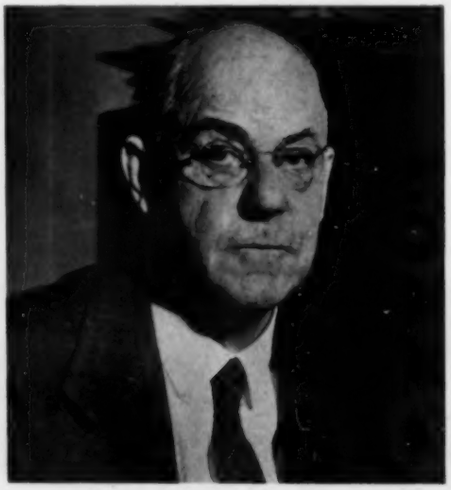
DR. FREDERIC H. LAHEE has been appointed geological and research counsellor of the Sun Oil Co. a new post. He will be relieved of growing administrative detail in the Dallas division, where he has been chief geologist since 1920, and will be available for consultation on all matters of production science throughout the company.

Francis E. Heath was named chief geologist of the Dallas division. He has been chief petroleum engineer and assistant chief geologist. A. S. Rhea became chief petroleum engineer of the Dallas division.

Dr. Lahee has been a member of the committee on Crude Oil Reserves of the American Petroleum Institute since its formation in 1936, and chairman of the committee since the death of J. Edgar Pew last fall. Organizer and first chairman of the committees on the application of geology and on statistics of exploratory drilling of the American Association of Petroleum Geologists, he was recently elected an honorary member of the association.

CHARLES W. SHAEFFER, 68, manager of the Socony-Vacuum refinery at Providence, R. I., retired July 1. He stayed on the job three years beyond his normal retirement age to assist the company through the closing days of the war and the initial postwar years. He was succeeded by Superintendent Henry A. Rickett.

Charles W. Shaeffer



Mr. Shaeffer wanted to be a baseball player but took a job as office boy in the office of the Devoe Works, Standard Oil Co. of New York, at 26 Broadway. He became a bookkeeper and in 1907 superintendent of the can factory at Long Island City. In 1913 he covered 50,000 miles in Japan, China, India and Australia to inspect small can factories.

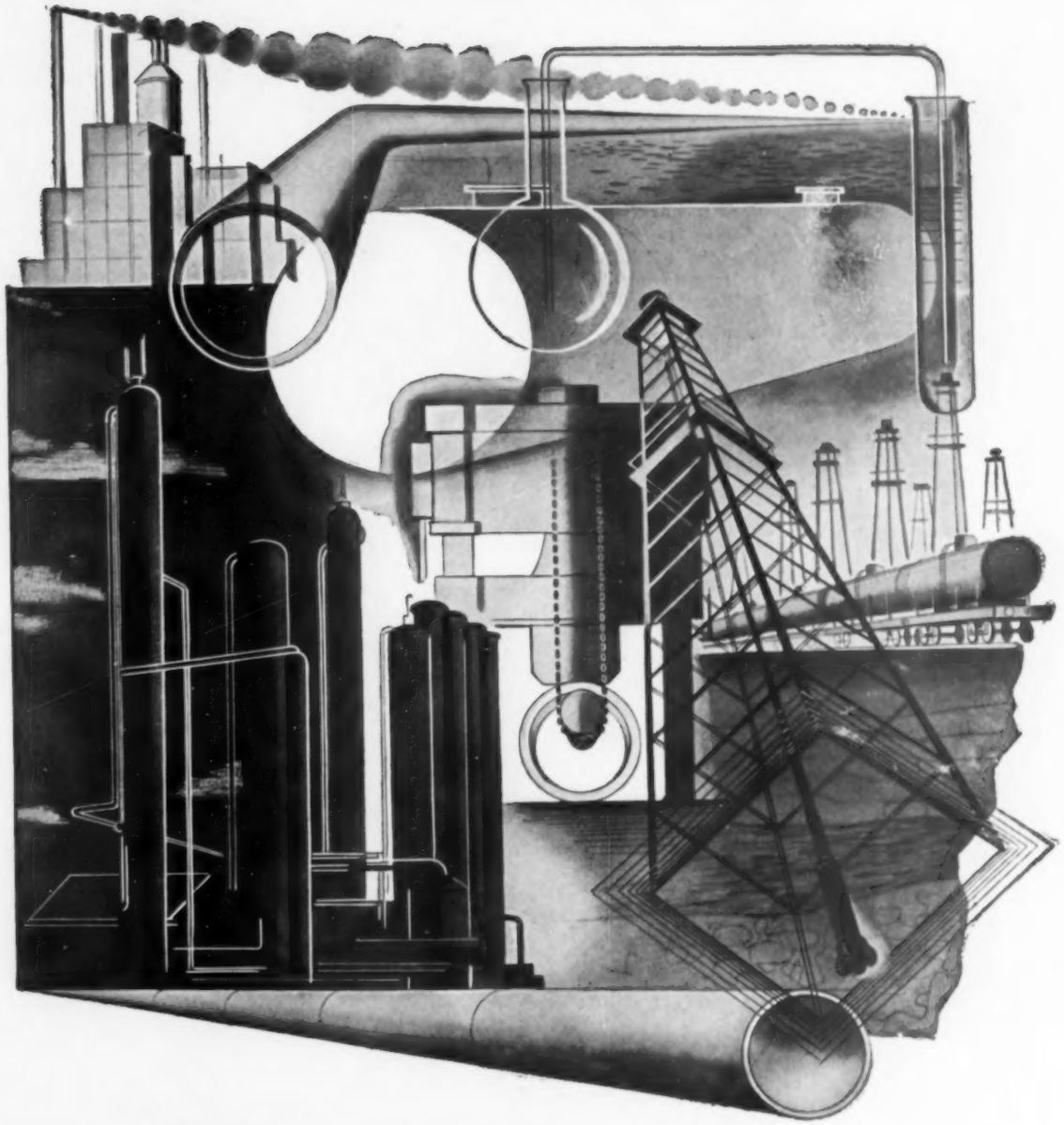
In 1918 he was placed in charge of the Long Island refinery and moved to the East Providence refinery two years later as manager. Mr. Shaeffer operated New England's first oil-products pipe line laid in 1931 from Providence to Springfield and Worcester, Mass. Ten years later he directed the building of between 600 and 700 miles of additional pipe lines.

STANLEY J. MEISENBURG, assistant superintendent of the Shell Oil Co. refinery at Wood River, Ill., in charge of cracking and alkylation, has been appointed assistant manager of the research and development department with headquarters at New York. He is succeeded at Wood River by Albert H. Garrison, assistant superintendent of the Houston refinery. Promotion of Mr. Garrison caused the move of Mason A. Rogers from head of the lubrication division at Wood River to Houston and he, in turn, is succeeded by Joseph M. Wilson of the products application department at Wood River.

T. L. LENZEN has been appointed general manager of eastern hemisphere operations by Standard of California. In this new position he will continue, on an expanded scale, the duties he has performed since 1944 when he was made assistant to the vice president, foreign operations. His work will include contact with the foreign producing and marketing companies in the Eastern Hemisphere with which Standard is affiliated and with the stockholders of these same affiliated companies.

Mr. Lenzen came to Standard of California in 1928, and until 1941 he was engaged in various capacities in the engineering department, including surveys of engineering problems in Egypt, Saudi Araiba and Bahrein. From 1941 to 1944 he served as assistant to the manager of Standard's foreign producing department. He has also served as secretary and a member of the company's foreign operating committee, and has had close affiliations with Arabian American Oil Company; the Bahrein Petroleum Company, Ltd.; the California Texas Oil Company, Ltd.; American Overseas Petroleum Company and other companies operating outside the United States.

T. L. Lenzen



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SIDNEY A. SWENSRUD has been elected executive vice president and a member of the board of directors of the Gulf Oil Corp. To accept the new position, Mr. Swensrud resigned as executive vice president of the Standard Oil Company of Ohio. He assumed his new duties around the middle of June.

In August, 1928, Mr. Swensrud became assistant to the president of Sohio. He was made vice president in charge of production, supply and transportation in August, 1939. The following April he was elected a director and became executive vice president in 1946.

Throughout his career in the oil business, Mr. Swensrud has been acting in industry matters. He served as a member of the economics committees of the Federal Oil Conservation Board and the American Petroleum Institute in the early and middle 1930's. He was vice chairman of the Petroleum Division, Economics Section, American Institute of Mining and Metallurgical Engineers from 1935 to 1938. He also served as an oil industry witness for the marketing branch before the Temporary National Economics Committee (TNEC) in 1939.

During the war Mr. Swensrud served with the petroleum industry committees on transportation, supply and economics for District II; also on the economics sub-committee and the post-war readjustment committee of the Petroleum Industry War Council. In addition he was vice chairman of the National Refiners Advisory Committee to the Office of Price Administration.

Following the conclusion of the war, he served on a committee for the preparation and presentation of material to the Special Senate Committee on Petroleum Resources of the United States and presented the testimony before this committee on disposition of the Big Inch pipe lines. At present he is a member of the American Petroleum Institute's transportation committee, pipe line study committee, and District II public relations committee; also a member of the Economics Advisory Committee to the Interstate Compact Commission.

E. J. Whetzle

Ideco Moves Advertising Headquarters

Advertising headquarters of International Derrick and Equipment Company has been moved from Columbus, Ohio, to 1315 Pacific Avenue, Dallas, Texas, according to announcement made by O. M. Havekotte, president. All of the advertising activity of the company will be handled from the office in Dallas under the direction of E. J. Whetzle, advertising manager. Fuller and Smith and Ross service the account. Mr. Whetzle, who has directed Ideco's program for the past two years, is formerly from the southwest where he handled the advertising for an oil field manufacturer at Shreveport, La.

Hunt Export Appointments

Hunt Export Company announced this week the appointment of A. J. Thomas as a representative in the northern part of South America. Thomas has spent the last ten years in the oilfields of Trinidad and Venezuela as head of Thomas Well Service. He will make his headquarters in Port-of-Spain, Trinidad, and will cover the oilfields of Trinidad, Venezuela, Colombia, Equador and Peru.

A. D. Bolland, in charge of Hunt Export Company's office in Buenos Aires, will continue to cover the southern part of South America. Hunt Export Company also maintains offices and representatives in New York, Houston and Mexico City.

Graves Visits Europe

B. I. Graves, vice president of Tide Water Associated Oil Co. is on an extended trip to European countries where Tide Water operates. The company operates in some fifty countries. On his present trip Mr. Graves will confer with subsidiaries and distributors in England, Switzerland, Holland, Germany, Sweden, Denmark and Norway.

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Col. V. S. Zavoico

Colonel Vassily S. Zavoico, former Russian industrialist and an active figure in international oil affairs, passed away on June 8 in New York at the age of 75. Col. Zavoico was born in St. Petersburg, now Leningrad, and was a grandson of Admiral V. V. Zavoico who commanded the Russian Pacific fleet during the Crimean War. Following his graduation from the Alexandrovsky Lyceum in St. Petersburg, he was attached to the Russian embassies in London and Paris. He was president of the Nobility Council of the province of Podolsk.

His connection with the oil industry included in his earlier years the management of several Russian companies, including Mantasheff, Lianosoff Bros., Emba-Caspian and Grozny. Later he became associated with Nobel Brothers, largest of Russian oil concerns in the pre-revolutionary period.

In 1917 Col. Zavoico was one of the leaders in an unsuccessful attempt to replace the Kerensky government and in the following year helped organize White Russian armies in Southern Russia. In 1919 he came to the United States to reside. For several years prior to his retirement, he was a European representative of Bethlehem Steel Company with offices in Paris. Surviving him are his widow, Mrs. Maria M. Zavoico, and two sons, Stephen V. and Basil B. Zavoico, the latter a well-known petroleum engineer and consultant with offices in New York and Houston, Texas.

Paul Randels

Randels is Oil Field Sales Chief

Sales and operations directions of the oil field division of Black, Sivalls & Bryson, Inc., have been concentrated in Paul Randels, formerly with the company at Fort Worth, Texas. He will move his headquarters to Kansas City and will coordinate all oil field sales activities in BS&B branches and sales offices.

Must Spend $3,000,000,000 Yearly

To keep pace with the swiftly growing demand for petroleum products, the oil industry must invest three billion dollars annually for the next several years or about three times the average rate of capital expenditures immediately preceding World War II. This was the statement made by Dr. R. E. Wilson, chairman of the board of Standard Oil Co. (Indiana), in addressing shareholders at the company's annual meeting. The money will be needed to locate and develop new sources of supply, to build pipe lines and refineries, to extend research, to improve facilities and to develop oil production in all parts of the world.

E. W. WEBB, formerly general production superintendent at Los Angeles, has been made assistant manager of the production department of Continental Oil Co., succeeding R. W. French, who recently resigned. He is succeeded by Gerald T. Pearson who has been California region petroleum engineer since December, 1946.

M. H. Dubrow, Fort Worth regional petroleum engineer, has been named chief petroleum engineer, a new position in the department. S. V. McCollum, division petroleum engineer at Midland, Tex., succeeds Dubrow as regional petroleum engineer at Fort Worth.

Webb joined the Continental organization as a petroleum engineer in February, 1927, at Seal Beach, Calif., and was production foreman at Seal Beach and Ventura, district superintendent at Ventura, and production engineer at Los Angeles before being made assistant general production superintendent at Los Angeles in 1936. He became general production superintendent in December, 1946.

RICHARD W. FRENCH has been appointed chief engineer and assistant to Production Vice President Earl D. Wallace of the Standard Oil Co. (Ohio). In addition to being in charge of the production department's staff of engineers, he will have charge of the production laboratory which Sohio has established at Oklahoma City and will represent Sohio in any overall research programs dealing with crude production. His offices will be at Oklahoma City.

Before joining Sohio, he was with the Continental Oil Co. for 14 years. He was that company's production engineer in California from 1936 until 1943, when he was named assistant manager of the production and drilling department for Continental at the home offices in Ponca City, Okla.

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International "R.L.G." primer is a combination of high-grade red lead and graphite of a special nature, both finely ground in an oil-varnish medium. "R.L.G." has many advantages over ordinary red lead. It has greater covering capacity and is consequently cheaper. If properly protected with a good finishing coat, it will remain flexible (even in hot climates) almost indefinitely. Because of these properties, "R.L.G." is particularly suitable for refinery installations, and for housing in the tropics.

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Oil Man Patents "Air-Flow" Pockets

Joseph W. Lewis, Jr., long-time oil man and originator of the side stream stripper, has been granted a patent covering the use of a mesh cloth for pocketing material in men's trousers. Mr. Lewis recognized that a draft condition existed in the leg of a man's trouser inasmuch as the leg temperature of 98.6°F is usually higher than the atmospheric temperature. However, any upward movement of air was impossible in the trouser leg, as presently constructed using dense pocketing material. Lewis merely removed the cap from this potential stack by providing a pocket of mesh material, such as nylon, which not only functions satisfactorily for holding most any normal object but also provides an outlet for the upward movement of the air over the legs, thereby giving much greater comfort, particularly in the warmer weather.

Lewis has been with the Foster Wheeler Corp. for the past five years and is the imagination behind those striking Foster Wheeler advertisements which appear in WORLD PETROLEUM.

New Plug Gate Valves

Crane Co., Chicago, announces a new line of corrosion-resistant plug gate valves which are unique in that they combine the advantages of the two most important basic types of valves. The new design provides a straight-through flow in the wide open position as do conventional gate valves, yet it is as suitable for throttling service as conventional globe valves.

Of outside-screw-and-yoke design, the new Crane plug gate valves have bolted bonnet joints and are available with either screwed or flanged ends in sizes from one-half to two inches. They are regularly furnished in either 18-8 Mo or Monel metal. For particular corrosive conditions they can also be made in various other alloys.

Named Executive Vice President

D. R. Thornbury, vice president of Mid-Continent Supply Co. has been appointed executive vice president and is moving from Houston to Fort Worth headquarters. J. A. Daugherty of the Tulsa offices is moving to Houston to replace him. W. I. West of the Odessa offices also moves to Houston as division manager. S. R. Clinkscales, tubular division manager at Tulsa, steps up to the managership of the Tulsa and northern division.

Bob Medearis to Mid-Continent

Robert C. Medearis is returning to the mid-continent area for the Patterson-Ballagh division of Byron Jackson Co., manufacturers of oil field specialties. He will work out of Houston. Mr. Medearis first joined Patterson-Ballagh in 1933. During the war he served four and a half years as a pilot in the USAAF and was discharged as a captain.

Oil Industry Movies

Three motion pictures telling the story of the oil industry have been prepared recently by companies not connected with the industry itself.

International Harvester Co. has produced a two-reel sound film in color titled "Power That Brings You Oil" which seeks to familiarize the layman with ramifications of the industry. The film may be obtained by interested groups by applying to the consumer relations department of International Harvester at 180 North Michigan Ave., Chicago 1.

Raphael G. Wolff studios at Hollywood have produced a three-reel motion picture in sound and color for General Electric Co. which is titled "Lease on the Future." Shooting was done from Pennsylvania to California and stresses the importance of electric power in drilling and pumping. The picture is shown through the GE organization.

The Jim Handy organization has produced "The Story of Oil" as a sound slide-film in full color for the national sales division of the Coca Cola Co. The film was designed to interest civic groups as well as students. The American Petroleum Institute and other associations helped. Showings may be arranged without charge through local Coca Cola bottlers or the national sales division at 515 Madison Ave., New York 22.

Instrumentation Course

The Agricultural and Mechanical College of Texas will conduct its second annual short course in instrumentation for the process industries at College Station, August 27-28-29. Last year's course was attended by more than 200 engineering, technical and operating men.

The course is outlined on an engineering level. The speakers scheduled for this year's session will be drawn largely from operating companies. For those interested who might have been omitted from the mailing lists, further information can be obtained by writing Dr. P. G. Murdoch, Engineering Dept., A & M College, College Station, Texas.

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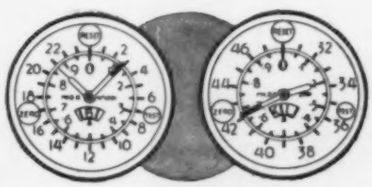

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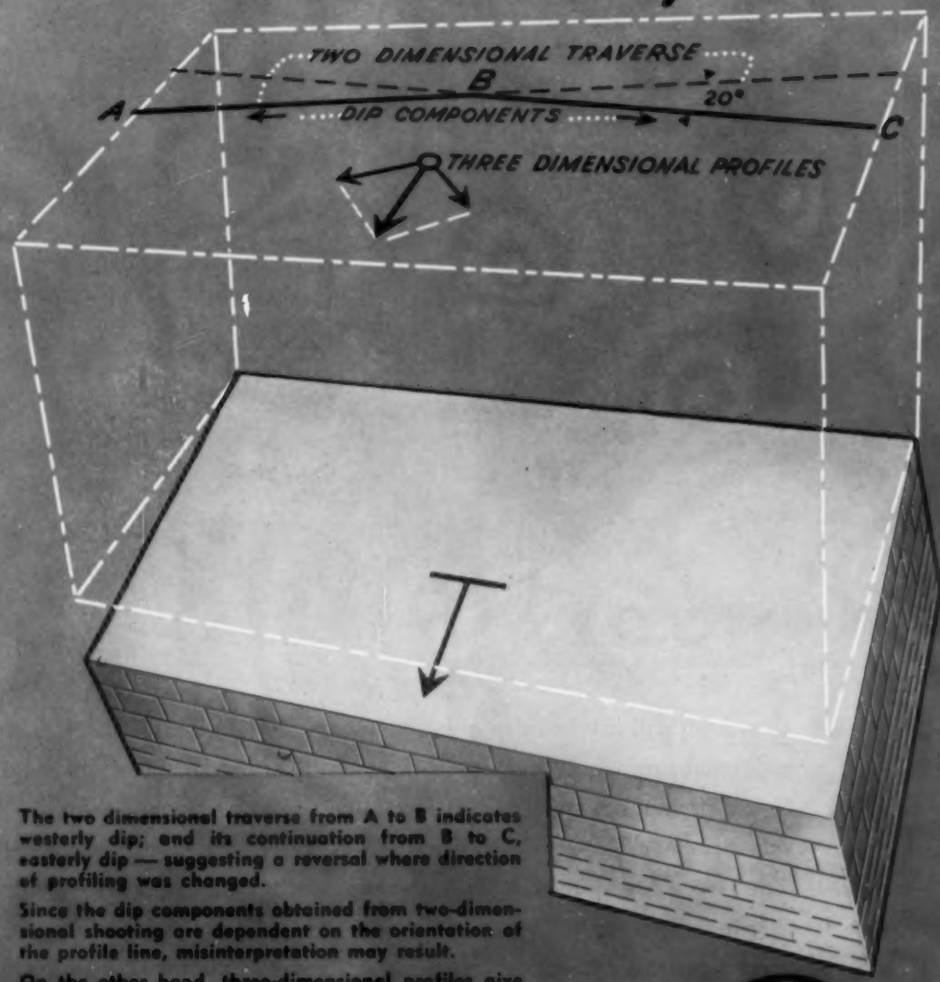

The two dimensional traverse from A to B indicates westerly dip; and its continuation from B to C, easterly dip — suggesting a reversal where direction of profiling was changed.

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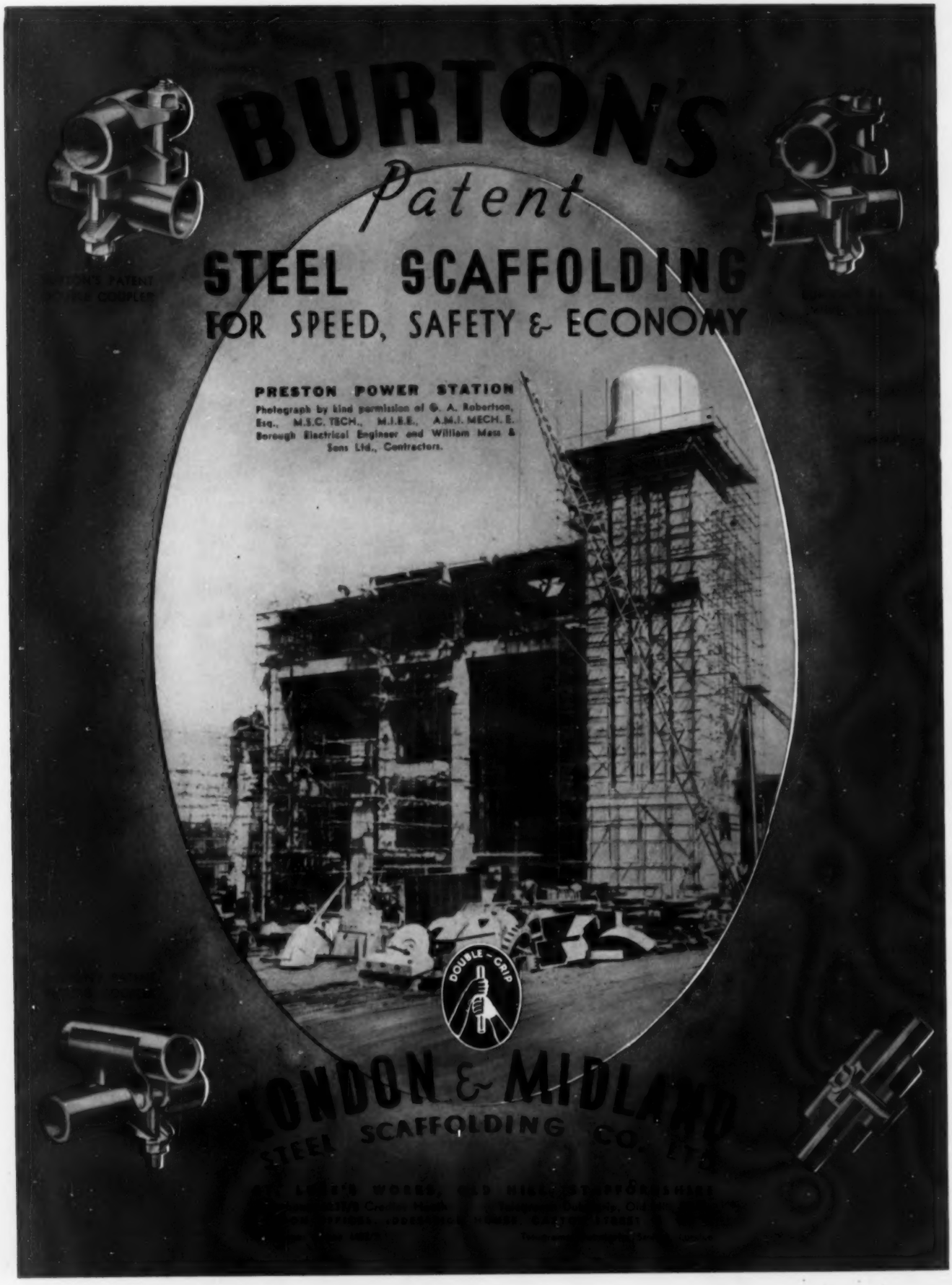
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Kellex Annual Report

The 1946 annual report of The Kellex Corp. subsidiary of The M. W. Kellogg Co., reviews that company's research work since the close of the war and outlines its future activities. Kellex engineered the K-25 plant at Oak Ridge, Tenn., and has decided that it will continue research and development of the four principal divisions of nuclear energy application: propulsion, central power, isotopes and means of directly converting nuclear energy to useful work.

A considerable part of the Kellex current activity deals with guided missiles. At the Applied Physics Laboratory, Silver Springs, Md., work is in progress in cooperation with Johns Hopkins Univ., under a Navy Department contract.

Memorial Fund

Friends of the late Walter Elliot, who was general drilling superintendent of Shell Oil Company at the time of his death February 7, 1947, has established a memorial fund in his honor. The fund will be used by Stanford University's School of Engineering.

John A. Lloyd

John A. Lloyd, director manager of the foreign sales department of Sun Oil Company since October, 1940, died June 20 following a heart attack. Born in Doulous, Wales, he served with distinction as a regimental sergeant major with British forces during World War I, part of the time with the famous Canadian Princess Pats. He received a severe bayonet wound at Vimy Ridge among other injuries. He held the Croix de Guerre with three palms and the Order of Leopold, highest honor of the Belgian government.

Mr. Lloyd first joined Sun in 1922 as a clerk in the Chicago sales district. The following year he was appointed office and credit manager and subsequently became assistant to the district sales manager at Toledo, Ohio; office manager at the western regional sales headquarters in Detroit, and assistant manager of foreign sales in 1937.

Organizes Exploration Department

Formation of a new exploration department, with George M. Cunningham as general manager, was announced today by Standard of California. O. J. Haynes will be assistant general manager. The department is to handle Standard's land and lease, geological and exploration activities, with the exception of exploratory drilling.

Appointments to new positions in the department include W. P. Winham, superintendent of exploration, southern district; G. L. Knox, superintendent of exploration, northern district; A. J. Solari, superintendent of exploration, Bay district, and W. F. Barbat, assistant chief geologist.

Exploration department staff members who will continue with their former titles are W. S. W. Kew, chief geologist; S. H. Gester, assistant chief geologist; G. H. Gester, consulting geologist; Phiy Gaby, consulting geophysicist; G. F. Schroeder, manager, land and lease division, and L. H. Hines, assistant manager, land and lease division.

Instrument Chart

A two-page chart (R-1066) titled "Basic Characteristics of Useful Industrial Laboratory Instruments" has been prepared for free distribution by North American Philips Company, Inc., 100 East 42nd Street, New York. Fifteen instruments are covered in the tabulation and include the following: colorimeter, cyclograph, electron microscope, Geiger-counter x-ray spectrometer, magnaflux, mass spectrometer, photometer, photelometer, spectrograph, spectrohotelometer, spectrophotometer, x-ray diffraction, zyglo, electron diffraction and supersonic. A diagram accompanies each case to show the basic arrangement.

New Research Company

Esso Development Company, Ltd., a non-profit organization, has been formed to assist Anglo-American Oil Company, Ltd., and other European affiliates of Standard Oil Company (N. J.) in various marketing and research problems. Anglo-American owns 75 percent of the stock and Standard Oil Development Company 25 percent.

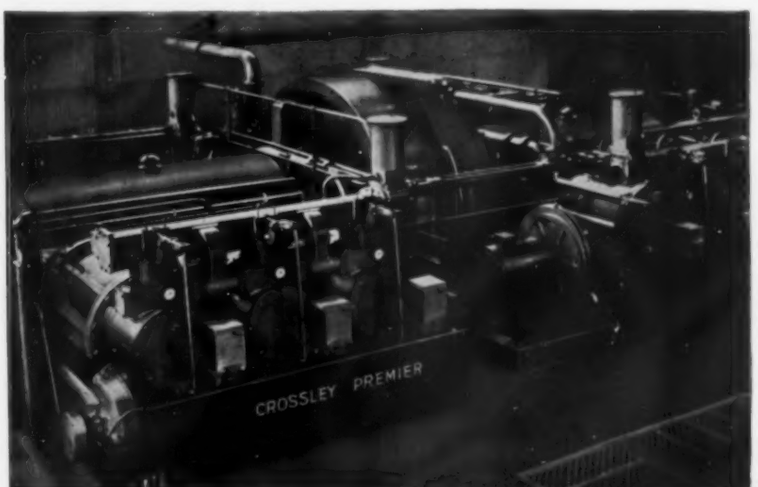
D. A. Shepard, chairman of the board of directors of Anglo-American, is also chairman of the board of the new company. Other directors are R. A. Carder, managing director of Anglo-American, and Brian Mead, London representative of Jersey Standard's refining operations.

137 Los Angeles Nomads

B. M. Landis, secretary of the Los Angeles chapter of Nomads, reports that the chapter now has 137 members. Of these, 106 are regular members, 26 associate and five honorary. During the last year the chapter entertained 96 international visitors to Los Angeles from 18 foreign countries.

Strader Heads Brown Tool Sales

Brown Oil Tools, Inc. and Brown Well Service, Houston, announce the appointment of Harold L. Strader as sales director. Previous to his work with the Brown organization, Mr. Strader represented Hughes Tool Co. as sales engineer, and before that he was a division engineer for The Texas Co.



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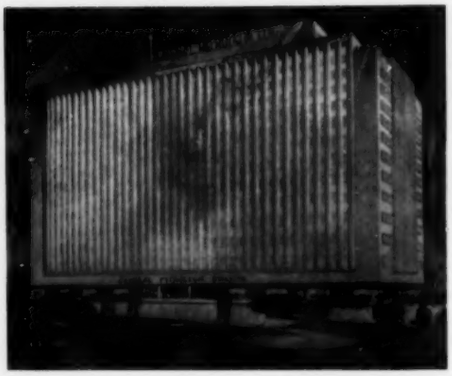

General Petroleum to Build

General Petroleum Corporation has announced plans for the construction of a new $5 millions office building in Los Angeles. The new building will occupy a half block between Wilshire Boulevard and Sixth Street and fronting on Flower Street.

First floor of the new building will be rented for stores. Remaining 12 stories will provide office space for upwards of 1200 General Petroleum employees. Garage facilities will be erected by the company at Eighth and Flower to minimize parking and traffic congestion. It is anticipated that construction work can be begun by next July.

Heads Drilling Contractors

J. E. Warren of the Carl B. King Drilling Company, Midland, Texas, was elected president of the Association of Oilwell Drilling Contractors at the annual convention held in San Antonio. H. C. Milhoan, Milhoan Drilling Company, Tulsa, was elected vice president at large and Charles Paine, Dallas, Treasurer. Brad Mills was re-elected executive vice president and Doyle Settle, secretary. Regional vice presidents are C. J. Davidson, Fort Worth, for West Texas; Joe Morris, San Antonio, for Gulf Coast; Sol Mealy, Tulsa, for Mid-Continent and Rocky Mountain; E. C. Brown, Long Beach, for California; Guy White, Evansville, for Central States; E. E. Pickering, Houston, is vice president for well servicing and Emery Carper, Artesia, N. Mexico, for cable tools.

Awarded Hydrocol Contract

Arthur G. McKee & Co., Cleveland, has been awarded a contract for the design, engineering, and construction of the Carthage Hydrocol plant at Brownsville, Texas. The plant will manufacture synthetic petroleum products and chemicals from natural gas using the Hydrocol process developed by Hydrocarbon Research, Inc. Hydrocarbon is furnishing the basic plant design and McKee is engineering-contractor, according to the announcement of G. G. Gabrielson, president of Carthage Hydrocol.

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Soviets Place Large Order

The Russian government has placed orders with Dresser Industries, Inc., Cleveland, Ohio, for eight deep-drilling rigs, 26 portable drilling rigs, 10 portable clean-out rigs, over 100 pumping units, a liquid methane plant and various other miscellaneous equipment, it was announced recently by J. B. O'Connor, executive vice president of Dresser, on his return from eight weeks spent in Moscow negotiating the sale.

The deep-drilling rigs, made by International Derrick & Equipment, one of the Dresser member companies, are capable of drilling to 15,000 feet, with automatic controls that reduce manual labor to a minimum, hydraulic control type of transmission and the latest Security bits of the type designed for deep drilling in the Rockies. These rigs will be used in the fields between the Volga and the Urals in the District of Kuibysheve. The rambler rigs, with portable equipment capable of drilling to 6000 feet; the clean out rigs, capable of operating to 9000 feet; and the pumping units—all three likewise Ideco products—will be put to work for rehabilitation purposes in the Maikop field that was well-nigh destroyed during the war.

"The Russian program of petroleum and gas rehabilitation and development, which is part of the current five-year plan, is a really stupendous undertaking," Mr. O'Connor reports. "To understand it, one must bear in mind that the Russian program embraces plans for the entire nation; that it is much larger in its potentialities than would be a similar program conducted by any one company in the United States; and that eventual possibilities are unlimited because of the vast reserves of crude which as yet have hardly been tapped.

"In carrying out this program, the Russians are using the finest and most modern type of equipment. I talked with top technicians in the production, refining, natural gas and other divisions of the program who are truly experts in their fields and who uniformly possess an almost unbelievable capacity for a hard day's work. It was interesting that many of them had in past years spent some time in the United States, and in fact I had first become acquainted with many of them upon their visits to the States in prewar years.

"An an example of modernization, in their cracking units they are now replacing pumps of the horizontal reciprocating type by those of the centrifugal hot oil type such as those now made by Pacific Pumps, another one of our member companies.

"The Russians are determined to rehabilitate the fields destroyed by the war by clean-out, repair and new drilling. In addition they intend to develop new fields by deep-drilling methods just as modern as those employed in our own country.

"Of particular interest is the natural gas pipe line running between Saratov and Moscow. Moscow is not only a metropolis—it is a big industrial center. It is expected that the increased supply of natural gas to Moscow will relieve pressure on the railroads that are now overtaxed by carrying peat, lignite and fuel oil. I inspected this pipe line. It is a good job. A compressor station on this line which I visited is not only up to the latest American technical standards but is designed furthermore to operate in temperatures as low as 40° below zero. This is the line which will be served by the liquid methane plant to be designed and installed by the Stacey-Dresser Engineering Division of Stacey Bros. Gas Construction Company, another one of the Dresser member companies. This plant will handle storage of liquefied natural gas for stand-by and peak-load purposes."

On his European trip, in addition to Russia, Mr. O'Connor visited England, Sweden, France, Holland and Ireland.

B. E. VANARNSDALE of Casper, Wyo., has been promoted to manager of the land department of General Petroleum Corporation's Rocky Mountain district.

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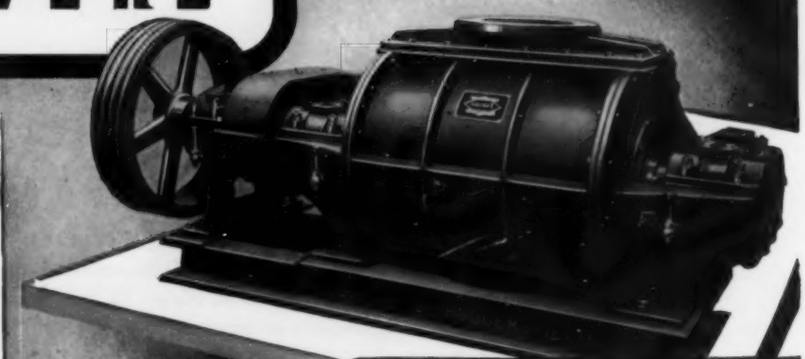

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Italy a Promising Oil Market

(Continued from page 56)

much-needed foreign exchange. With this end in view special efforts are made to improve state highways and to expand bus facilities since the completion of needed improvements on the railways will require considerable time. Since the accomplishment of this objective will depend upon the provision of an ample supply of petroleum products, it is expected that liquidation of the Italian Petroleum Board (Comitata Italiano Petroli) will be completed promptly as a step toward restoring the free activity of oil companies in developing their marketing facilities.

Along with projected developments in the provision of motor fuel and its related products are other important plans for the wider distribution of gas to be used for industrial power and domestic heating. In this field an important step has been the organization at Rome of the Societa Italo Americana del Metano which has in hand a project for exploitation of the methane resources in the Po Valley. At present the output of methane in Italy is roundly 1,500,000 cubic meters daily, while the American project proposes to increase this output to 15 million cubic meters by increasing drillings from 400-500 meters to a depth of 1,000 meters. In order to utilize this larger output, the company intends to construct a gas pipe line from Rovigo, where reserves are estimated to reach 150 million cubic meters, to Legnago, Desenzano, Brescia, Treviglio and Milano. From Treviglio another pipe line will lead to Dalmine and Bergamo, the whole system supplying gas to the most important industries of Northern Italy. The cost of carrying out the construction of the line has been estimated at five milliard lire. The project provides also for the possible building of a supplementary line from Rovigo to Padova and Verona which should reach the main gas line at Desenzano. (The pipe to be used in the construction of the line will have a diameter of 35 cm and compressor stations will ensure the circulation of methane at a pressure of 400-500 atmospheres.)

According to the opinion of Italian power experts, the carrying out of this project will greatly reduce Italian dependency upon coal imports as an output of 15 million cubic meters of methane daily would result in the saving of 7,500,000 tons yearly in coal consumption, which in prewar times was about 12,000,000 tons, and would favor the conversion from coal to oil combustion as Italian diesel engine builders have produced types of diesels capable of using either methane or oil.

Apparently the Italian government is prepared to grant the company a concession for the operation of the methane gas resources in Northern Italy, while the city authorities of Milan are ready to negotiate a contract to supply Milan with the gas, both for household and urban transport purposes.

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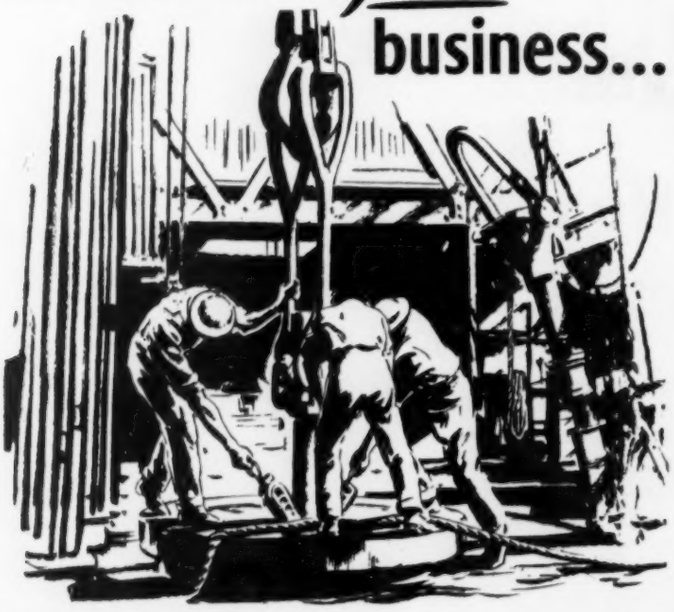

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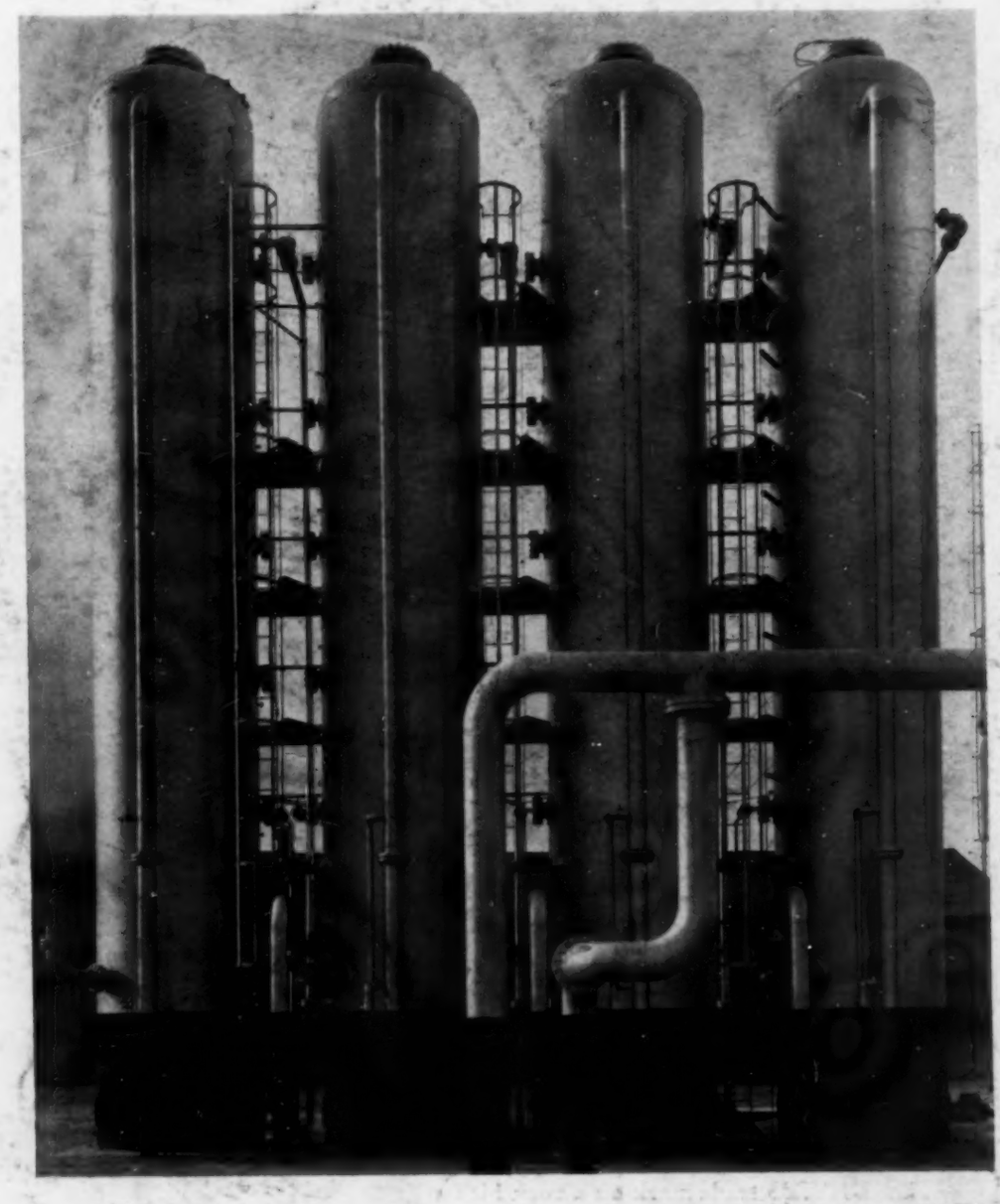

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